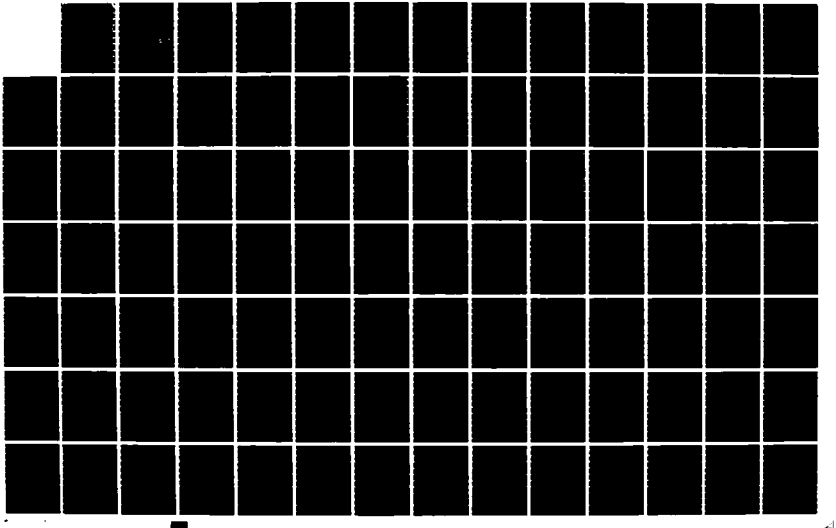
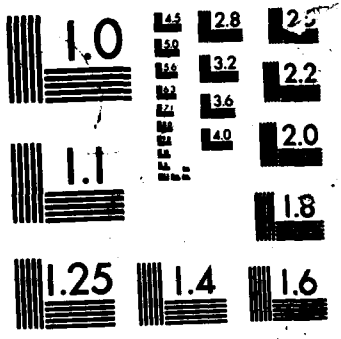
AD-A166 744 A COMPUTER PROGRAM FOR OPTIMIZING LONG HAUL TELEPHONE NETWORKS FOR LEAST..(U) AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH S A DRAPER 1986 1/3

UNCLASSIFIED AFIT/CI/NR-86-48T F/G 17/2 NL





MICROCOP CHART

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER AFIT/CI/NR 86-48T	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* A Computer Program for Optimizing Long Haul Telephone Networks for Least Cost Via Common Carrier Wide Area Telephone Service (WATS)		5. TYPE OF REPORT & PERIOD COVERED THESIS/DISSERTATION 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Stephen A. Draper		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS AFIT STUDENT AT: University of Colorado		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS AFIT/NR WPAFB OH 45433-6583		12. REPORT DATE 1986 13. NUMBER OF PAGES 184
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* UNCLASS 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

APPROVED FOR PUBLIC RELEASE: IAW AFR 190-1

LYNN E. WOLAVER 11 April 86
Dean for Research and
Professional Development
AFIT/NR, WPAFB OH 45433-6583

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

Draper, Stephen A. (M.S., Telecommunications)

A Computer Program for Optimizing Long Haul Telephone Networks for Least Cost Via Common Carrier Wide Area Telephone Service (WATS)

Thesis directed by Professor Floyd K. Becker

With the breakup of American Telephone and Telegraph (AT&T) nearly two years old, many businesses and government agencies are just starting to feel the impact. Equal access, the process of making four wire direct trunk connections available for all long haul common carriers to the local telephone switch, is now being offered incrementally throughout the country. People are being asked to choose the carrier they want to carry their traffic.

Businesses and governments have had WATS available as a cost saving measure even before the divestiture of AT&T; however, divestiture has created additional savings possibilities for WATS through competition. A tool is needed for businesses and governments to make an informed decision. It would be simple if one carrier was the cheapest for all network configurations, but that is not the case. The least costly alternative is different for each specific network configuration and usage pattern of the customer.

Various algorithms have been designed[4] for this purpose; however, the real test of their worth as decision making tools is the development and use of a final product. The purpose of this thesis is to develop

ABSTRACT OF THESIS

1. Author: Capt. Stephen A. Draper, USAF.

2. Title: A Computer Program for Optimizing Long Haul Telephone Networks for Least Cost Via Common Carrier Wide Area Telephone Service (WATS).

3. Degree: Master of Science in Telecommunications.

4. Institution: University of Colorado at Boulder.

5. Year: 1986

6. Pages: 184

7. Description: With the breakup of American Telephone and Telegraph (AT&T) nearly two years old, many businesses and government agencies are just starting to feel the impact. Equal access, the process of making four wire direct trunk connections available for all long haul common carriers to the local telephone switch, is now being offered incrementally throughout the country. People are being asked to choose the carrier they want to carry their traffic.

Businesses and governments have had WATS available as a cost saving measure even before the divestiture of AT&T; however, divestiture has created additional savings possibilities for WATS through competition. A tool is needed for businesses and governments to make an informed decision. It would be simple if one carrier was the cheapest for all network configurations, but that is not the case. The least costly alternative is different for each specific network configuration and usage pattern of the customer.

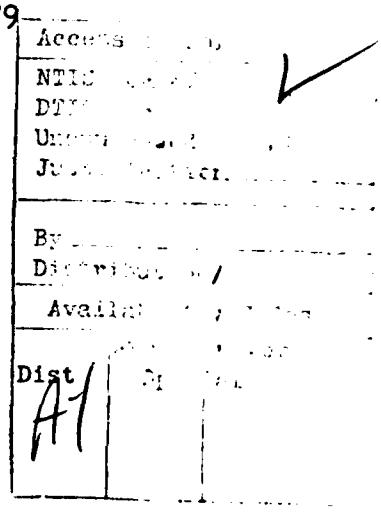
Various algorithms have been designed[4] for this purpose; however, the real test of their worth as decision making tools is the development and use of a final product. The purpose of this thesis is to develop an actual applications software program to optimize WATS service for lowest cost. The program will provide cost information for the customer's current configuration for each of the major common carriers, i.e. AT&T, Microwave Communications Incorporated (MCI), General Telephone and Electric (GTE) SPRINT, and Satellite Business Systems (SBS) Skyline. Additionally, the program will optimize the customer's network configuration for each of those carriers.

A COMPUTER PROGRAM FOR OPTIMIZING LONG HAUL TELEPHONE NETWORKS FOR LEAST COST VIA COMMON CARRIER WIDE AREA TELEPHONE SERVICE (WATS)

by

Stephen A. Draper

B.M., Berklee College of Music, 1979



A thesis submitted to the

Faculty of the Graduate School of the

University of Colorado in partial fullfillment

of the requirements for the degree of

Master of Science

Program in Telecommunications

1986

This Thesis for the Master of Science Degree by

Stephen A. Draper

has been approved for the

Program in Telecommunications

by

Floyd K. Becker

Robert J. Williams

Michael J. Chase

Date 20 Dec 1985

an actual applications software program to optimize WATS service for lowest cost. The program will provide cost information for the customer's current configuration for each of the major common carriers, i.e. AT&T, Microwave Communications Incorporated (MCI), General Telephone and Electric (GTE) SPRINT, and Satellite Business Systems (SBS) Skyline. Additionally, the program will optimize the customer's network configuration for each of those carriers.

Chapter I introduces the goals and criteria used in development of the software. Chapter II identifies the assumptions used in the algorithms along with data for each carrier's method of calculating charges. Chapter III contains a step by step view of screen displays, how to use the program, required data input, and expected output. Chapter IV contains an example of a network configuration, results from the program, and how the program can be used in making a management decision to decrease costs and/or improve service. Chapter V contains conclusions.

To Dottie, my wife

and Joshua, Benjamin, Michael,

Noah, and Abraham, my children

ACKNOWLEDGEMENTS

Laurie Cullip of AT&T, Cindy Schmidt of MCI, Pat Smith of GTE SPRINT, and Carol Pettibone of SBS Skyline provided key data and information on customer billing procedures and calculation of circuit usage. John Nolan of the 1837 Information Systems Squadron was very helpful in providing phone bills for Lowry Air Force Base, Colorado.

Dr. Harvey Gates, BDM Corporation, provided the necessary background needed to accomplish this thesis in his data communications course. This gave me the idea for the topic.

Of critical importance was the contribution of the members of my thesis committee: Professor Floyd K. Becker, Chairman of the committee and thesis advisor, Robert J. Williams, and Michael J. Chase.

Finally, a special thanks to my wife, Dottie, and my children for their patience and forbearance during a difficult time.

CONTENTS

CHAPTER

I. INTRODUCTION 1

Purpose 1

Goals and Criteria 1

II. ALGORITHM 3

Definitions 3

Assumptions 6

AT&T Costs 8

MCI Costs 9

GTE SPRINT Costs 10

SBS Skyline Costs 10

Overview 11

Determine Least Cost WATS Carrier for Current Network 13

Optimize Current Network for WATS Carrier 13

Load New Carrier Rate Tables 13

View Existing Results Files 14

Delete Results File 14

III. USING THE OPTICOM PROGRAM 15

Requirements 15

Beginning the Program 15

Option 1 - Determine Least Cost WATS Carrier for Current Network 19

Suboption 1 - Display Results on Screen . 25

Suboption 2 - Print Out the Results 30

Suboption 0 - Finished 38

Option 2 - Optimize Current Network 40
for WATS Carrier

Suboption 1 - Display Results on Screen . 47

Suboption 2 - Print Out the Results 47

Suboption 0 - Finished 47

Option 3 - Load New Carrier Rate Tables .. 54

Option 4 - View Existing Results Files ... 56

Suboption 1 - Display Results on Screen . 56

Suboption 2 - Print Out the Results 56

Suboption 0 - Finished 56

Option 5 - Delete Existing File 57

Option 0 - Finished 57

IV. DECISION MAKING WITH THE PROGRAM 58

V. CONCLUSION 66

BIBLIOGRAPHY 69

APPENDIX

A. OPTICOM PROGRAM FLOWCHARTS 70

Module Descriptions 75

/DELETE/ Directory Modules 75

/NEWNET/ Directory Modules 75

/NOWNET/ Directory Modules 77

/RESULTS/ Directory Modules 78

/TABLES/ Directory Modules 78

B. OPTICOM PROGRAM CODE 79

OPTICOM 80

/NOWNET/ 82
NOWNET 82
TEXT 85
COMPUTE 87
COMPAT&T 88
COMPMCI 90
COMPSPNT 93
SORT 96
COMPSBS 97
OUTPUT 99
DISPLAY 100
PRINT 105
FINISH 110
/NEWNET/ 111
NEWNET 111
OUTWATS 113
OUTCPUTE 116
OUTLINES 119
AT&TOUT 121
MCIOUT 123
SKYLINE 126
SPRNTOUT 128
OUTSTORE 131
INWATS 133
INCPUTE 136
INLINES 139
AT&TIN 141

INSTORE 143
OUTPUT 145
DISPLAY 146
DISPATT 147
DISPMCI 148
DISPSPNT 149
DISPSBS 150
DISPOUT 151
DISPTIN 152
DISPIN 153
PRINT 154
PRNTATT 155
PRNTMCI 156
PRNTSPNT 157
PRNTSBS 158
PRNTOUT 159
PRNTTIN 160
PRNTIN 161
/TABLES/ 162
TABLES 162
LOAD 163
/RESULTS/ 165
RESULTS 165
OUTPUT 166
DISPLAY 167
PRINT 168
/DELETE/ 169

DELETE 169

C. OPTICOM PROGRAM FILE STRUCTURES 171

/NOWNET/ 172

NOWNET.dbf 172

RESULTS.dbf 172

/NEWNET 173

POISSON.dbf 173

POSSIBLE.dbf 174

NEWNET.dbf 174

PEAKHR.dbf 174

RESULTS.dbf 175

AT&TOUT.dbf 175

MCIOUT.dbf 176

SPRNTOUT.dbf 176

SKYLINE.dbf 176

AT&TIN.dbf 177

/TABLES/ 178

AT&TOUT.dbf 178

AT&TIN.dbf 178

SPRNTOUT.dbf 179

SBSOUT.dbf 179

SBSIN.dbf 179

MCIOUT.dbf 180

SBSCONEC.dbf 180

CONSTANT.mem 181

DATE.mem 181

D. TRAFFIC MODELS 182

Poisson 182

Erlang B 183

Extended Erlang B 183

Erlang C 183

TABLES

Table

2-1 Comparison of Common Carrier Rate Structures.. 12

5-1 dBASE III Software and Compiler Sources..... 68

FIGURES

Figure		
3-1 to 3-66	Program Displays	16 to 57
A-1	Program Hierarchy Level 1	70
A-2	Program Hierarchy Level 2, NOWNET	71
A-3	Program Hierarchy Level 3, NOWNET	71
A-4	Program Hierarchy Level 4, NOWNET	72
A-5	Program Hierarchy Level 2, NEWNET	72
A-6	Program Hierarchy Levels 3 and 4, NEWNET	73
A-7	Program Hierarchy Level 2, TABLES	74
A-8	Program Hierarchy Levels 3 and 4, RESULTS ...	74

CHAPTER I

INTRODUCTION

Purpose

The purpose of this thesis is to develop an applications software to optimize a common carrier long haul telephone communications network for least cost utilizing Wide Area Telephone Service (WATS). The software is designed to be menu driven and requires no computer programming expertise by the user. The software is also self correcting; i.e., only valid data entries are accepted with the user receiving instructions on how to provide valid entries.

Goals and Criteria

1) A person with no computer experience should be able to use the program.
2) The user should not have to consult other documentation to use the program; i.e., explanatory information about each aspect should be provided on the display screen as the program progresses through each level of the menu.

3) The program should accept only valid data entries. It should ensure data is valid before computations are attempted.

4) The program should contain a provision to easily update all carriers' rate tables and criteria by loading from a floppy disk. The date of the rate tarrif on file with the Federal Communications Commission (FCC) that is being utilized will be displayed when the program is started. When new rate tables are loaded, the date will be updated.

5) The user should have the option of seeing the results on the screen, having them printed, or saving them for later use.

6) Output should be in individual reports to enable a communications manager to quickly make an informed decision on the least cost alternative for long distance common carrier WATS.

CHAPTER II

ALGORITHM

Definitions

A. Access Charge: The monthly amount which the local telephone company charges to use its facilities to connect to the long distance carrier. This reimburses the telephone company for circuit usage attributed to long distance use.

B. Band: A geographic service area for WATS extending from the originating location of the service. Band 0 is intrastate service only and can only be provided by the local telephone company. Band 1 includes the contiguous states but does not provide Band 0 service. Bands 2 through 5 extend service further from the originating location with corresponding increases in usage charges. Band 5 service includes the entire continental United States. Any band of service includes all lower bands of coverage (except Band 0). Band 6 also includes Alaska and Hawaii.

C. Busy Hour: The continuous 60 minute period during the day when maximum calling volume occurs.

D. Carried Traffic: The amount of time a circuit or equipment is busy. Carried traffic equals connected traffic plus processing time.

E. Connected Traffic: The amount of time the origin and destination can communicate with each other. This is the total time both parties are off-hook. Bills received from common carriers are figured using connected traffic.

F. Connection Charge: A one time charge by the long distance carrier to establish service. The amount is based on the number of lines being provided.

G. Direct Distance Dialing (DDD): A method of calling long distance without operator assistance. Business and residential customers pay the same rates. Each call is calculated according to distance, time of day, and length of the call.

H. Erlang: A measure of telephone traffic as 60 minutes or one hour of equipment use.

I. Grade of Service: The probability that a caller will receive a busy signal on the first attempt. It is designated by a "P" plus a number. For example, "P.03" means a 3 percent probability of

a busy signal. Other conventions express it as "P03" which signifies the same thing. This program will use the latter.

J. Off-hook: Opening the loop between the user and the central office by lifting the receiver off the telephone.

K. Off-net: Utilizing AT&T facilities for any part of a connection.

L. On-hook: Closing the loop between the user and the central office by replacing the receiver on the telephone.

M. On-net: No AT&T facilities are utilized for any part of a connection.

N. Processing Time: The time used to establish and terminate a connection. Circuits are tied up during this time even though no actual connection or communication can occur. For this reason, connection time on a single line can never equal one erlang or 60 minutes.

O. Station Message Detail Recording (SMDR): A device to measure all user calling activity. Data provided includes date, time, origin, destination, and duration of the call. The duration includes some of the processing time.

P. Trunk: A communications path between switches.

Q. Usage Charge: The amount per minute or hour of connection time charged by the carrier for the connection.

R. Wide Area Telephone Service (WATS): A service to high usage business or government users with reduced rates per minute of connection. Service areas are identified by bands with all locations connected on a given line charged at the same rate. For example, all calls made on a Band 4 line would be charged at the Band 4 rate even though some destinations are in the lower rate Bands 1, 2, or 3.

Assumptions

This program is designed in order to accomodate many types of models one of which a particular network may approximate. Because the program operates through look-up tables, changing algorithms is a simple matter of loading a new look-up table for the grade of service. The program does not calculate costs of blocked calls which are redirected to DDD trunks. For purposes of this thesis, the poisson distribution is used for the look-up table[2] because it is simple, widely used, and in many cases the results are close to those given by Erlang B and Erlang C.[3] In Erlang B, calls are assumed to arrive in a random order so as to approximate an exponential distribution. Blocked calls are cleared from the system

and do not return; i.e., their is no queue so the caller must redial in order to make the call. This is expecially true of military installations because accountability is needed to prevent abuses of the system. Erlang B is also accurate in an automatic route selection system which allows blocked calls to immediately try the next higher band.

In systems where blocked calls are not cleared from the system and immediate overflow to the next higher band is not available, Extended Erlang B should be used. In systems where an infinite queue is available, Erlang C should be used. For unusual situations where a peaked or smooth traffic pattern exists, other formulas must be used. Additional details on traffic models are in Appendix D.

This thesis assumes that the average length of each call exceeds one minute. The reason for this is that most common carriers charge a minimum time of one minute times the number of calls. Telephone voice traffic will most always exhibit this behavior. The average would fall below one minute if most traffic was short data inquiries to a computer such as bank accounts. Even then, the user can still use the program by entering his time as one minute times the number of calls.

In optimizing the network for lowest cost, the algorithm uses as a default value, the worst grade of service for any of the customer's existing lines. If the

customer is satisfied with the existing grade of service, there is no need to pay for any better. If the customer is not satisfied with the present grade of service, a different one can be entered.

The network is optimized according to the busy hour service requirement of the customer. If the busy hour service is adaquate, all other times will be better than the busy hour.

AT&T Costs

AT&T calculates each WATS call to the nearest tenth of a second for the total time that both parties are off-hook. Charges are based on band, time of day, and the total accumulated time charged so far that month. The first 15 hours of use are charged at the highest rate, the next 25 hours at a lower rate, the next 40 hours at a still lower rate, and anything over 80 hours total use at the lowest rate. The hours for all lines of a given band are averaged before determining the charges. For example, if one had two Band 2 lines, one with 50 hours/month of use and another with 100 hours/month of use, charges would be calculated for two lines, each with 75 hours/month of use. This is done for usage during each of three time periods:

1) DAY - 8:00 A.M. to 5:00 P.M. Monday through Friday.

2) EVENING - 5:00 P.M. to 11:00 P.M. Sunday through Friday.

3) NIGHT/WEEKEND - 11:00 P.M. to 8:00 A.M. Sunday through Friday and all day Saturday.

AT&T has no minimum monthly usage charge. The access charge is $37.65/month for each outbound WATS line and $42.80/month for each inbound WATS line. Connection charges are $222.00 for the first line and $123.00 for each additional line. AT&T is the only carrier with true incoming WATS; i.e., the user dials "1-800-XXX-XXXX."

MCI Costs

MCI uses the same procedure as AT&T except each call is rounded to the nearest six second interval. MCI has a minimum usage charge of $75.00 per line. Access charge is $100.00/month per line. Connection charge is $120.00 per line. MCI also has separate on-net and off-net rates. Unless the customer knows his actual calling pattern through use of a detail call recording device, default values of 80% on-net and 20% off-net are used for calculating costs in the algorithm. The customer can enter his own values if he chooses. For example, a stock brockerage would probably have close to 100% of his calls on-net (large metropolitan cities); whereas, a farm implement company would be just the opposite.

GTE SPRINT Costs

SPRINT uses the same procedure as MCI; however, its crossover points for reduced rates occur at 40, 70, and 100 total usage hours/month. SPRINT has no minimum usage charge. Access charge is $100.00 per line. Connection charge is $105.00 per line. SPRINT also has a feature which AT&T and MCI do not. SPRINT bills for the exact band of the call, not the band of the trunk utilized. All calls can travel over a single line (provided busy hour traffic permits this) and each call will be billed according to the band of the destination. SPRINT breaks out its calls at the switch location and routes them over separate WATS band lines.

SBS Skyline Costs

SBS Skyline does not have separate bands as the other carriers do. It has a four tier structure as follows:

1) TIER I - Major metrolitan areas.
2) TIER II - Includes additional frequently called cities.
3) TIER III - Remainder of contiguous U.S., Puerto Rico, and the Virgin Islands not covered by Tier I, II, or IV.
4) TIER IV - Equivalent to WATS Band 1 coverage.

All traffic regardless of destination travels over the same channel. There are only two time of day

billing periods: day, 8:00 A.M. to 5:00 P.M., and all others. There is a minimum usage charge of $400.00 per channel if usage is below 50 hours/channel/month. Connection charge is $105.00 per line. Access charge is based on the distance from the customer to the SBS Skyline access point as follows:

0-1 Mile	$85.00/month
2-15 Miles	$100.00/month
16-25 Miles	$125.00/month
26-35 Miles	$150.00/month
36-50 Miles	$175.00/month
Over 50 Miles	$12.00/month plus other common carrier charges.

Table 2-1 provides a summary of all four carriers.

Overview

The name of the program is OPTICOM. There are five menu options for the user to choose in the main menu:

1) Determine Least Cost WATS Carrier for Current Network.
2) Optimize Current Network for WATS Carrier.
3) Load New Carrier Rate Tables.
4) View Existing Result Files.
5) Delete Existing File.

TABLE 2-1

Comparison of Common Carrier Rate Structures

	AT&T	MCI	SPRINT	SBS
Minimum Avg Call Length	60 sec.	60 sec.	60 sec.	30 sec.
Billing Period	1/10 sec.	6 sec.	6 sec.	1 sec.
Minimum Use	NONE	$75	NONE	$400 *
Access/Out	$37.65	$100	$100	**
Access/In	$42.80	N/A	N/A	N/A
Connection 1st	$222	$120	$105	$105
2nd	$123	$120	$105	$105
Use Reduction (Hours)	15 40 80	15 40 80	40 70 100	40 45 : : 250
Separate Band Trunks	Yes	Yes	No	No
Time of Day Periods	Day Eve Night	Day Eve Night	Day Eve Night	Day Other
Net Structure	N/A	2 Rates	2 Rates	4 Tiers

* If less than 50 hours.

** $85 to $175 depending on distance.

Determine Least Cost WATS Carrier for Current Network

This option will use the information provided on the customer's present monthly phone bill to calculate what the cost would be for all four carriers. This does not optimize his network; it uses his existing network configuration. For SBS Skyline, the number of channels is equal to the total number of AT&T lines in order to keep the average grade of service equivalent for comparison purposes.

Optimize Current Network for WATS Carrier

This option will utilize information obtained from a detail call recording device to optimize a network for each carrier. The network will have been previously entered in option 1 above and stored. The optimum network configuration for each carrier will be separately provided. The algorithm calculates the cost for all possible configurations and saves the lowest cost and configuration for each carrier. The program is written for up to Band 6. The maximum number of possibilities occurs when there is Band 6 traffic. The user either does or doesn't have each of the other five band lines so the maximum number of possibilities is 2^5 or 32.

Load New Carrier Rate Tables

This option enables all carrier rate tables, parameters, and minimums to be updated when new ones are filed with the FCC. This is done from a floppy disk.

View Existing Result Files

This option allows the user to either view or have printed the results previously calculated in options 1 and 2 above.

Delete Result File

This option allows the user to delete results previously calculated in options 1 and 2 above.

CHAPTER III

USING THE OPTICOM PROGRAM

Requirements

OPTICOM is written in the dBASE III language for use on any IBM PC compatible computer with a minimum of 384K of RAM and two 360K floppy drives or one hard disk and one floppy drive. It can be used with as little as 256K of RAM; however, new carrier rate tables cannot be loaded then. Since the program has not been compiled, the user must already have the dBASE III software. The program is run with the dBASE III software in either the hard disk or floppy drive A and the OPTICOM floppy in drive B. A printer is required to obtain hard copy results.

Beginning the Program

When dBASE III is first started, the screen appears as in Fig. 3-1. With the OPTICOM floppy in drive B, type "DO B:OPTICOM" as shown in Fig. 3-2 and then press <Return>. <> will be used to denote keys on the keyboard. The screen will appear as in Fig. 3-3. From here on, using the program is just a matter of following

the directions on the screen. The program will accept valid entries only. The screen will stay the same until a valid entry is made. The main menu for OPTICOM appears in Fig. 3-4.

---

dBASE III version 1.10 IBM/MSDOS ***

Press the F1 key for help
Type a command (or ASSIST) and press the return key (<--)

.

FIGURE 3-1

dBASE III version 1.10 IBM/MSDOS ***

Press the F1 key for help
Type a command (or ASSIST) and press the return key (<--)

. DO B:OPTICOM

FIGURE 3-2

OPTICOM VERSION 1.00 RATE TABLES AS OF: 1 JULY 1985
DECEMBER 2, 1985
STEPHEN A. DRAPER

OPTICOM is a software package designed to aid you, the communications manager in making decisions to optimize your long haul communications network. This program is currently limited to telephone traffic; however, future versions may be expanded to include data traffic as well. The program is menu driven so you needn't worry if you are uncomfortable with computers or programming. Each option, when selected, will provide a description along with the information you are required to provide. If you need a different selection, you can return to any level of the menu to make a different selection. Press <Esc> any time you wish to terminate the OPTICOM program.

Press any key to continue...

FIGURE 3-3

MAIN MENU

- 1 - DETERMINE LEAST COST WATS CARRIER FOR CURRENT NETWORK
- 2 - OPTIMIZE CURRENT NETWORK FOR WATS CARRIER
- 3 - LOAD NEW CARRIER RATE TABLES
- 4 - VIEW EXISTING RESULT FILES
- 5 - DELETE EXISTING FILE

- 0 - FINISHED

CHOOSE ONE:

FIGURE 3-4

Option 1 - Determine Least Cost WATS Carrier for Current Network

Upon selecting this option, the screen appears as in Fig. 3-5. The default for continuing is "N." Any response other than "Y" will return to the main menu. Additional explanatory information appears as in Figs. 3-6 and 3-7. Fig. 3-8 begins the process of entering data. Entries can be corrected by using the <Back Space> or <Del> keys and retyping correct values. Also, the cursor can be positioned by using the directional arrow keys on the numerical keypad. If the entries are valid, the screen will then appear as in Fig. 3-9. If the entries are not valid, the screen will again appear as in Fig. 3-8 with a message to reenter the data. The program automatically calculates the SBS Skyline Tier 4 percentage after the other values are entered.

Data entry for each WATS band is shown in Figs. 3-10 and 3-11. These continue until the last entry is made. The screen then appears as in Fig. 3-12. In Fig. 3-13, corrections, deletions, or additions can be made before calculations are performed. Instructions appear at the top of the screen ("^" means the <Ctrl> key). Once all data is correct, the user presses <Ctrl><End> and the screen appears as in Fig. 3-14. Fig. 3-15 appears when all calculations are complete.

DETERMINE THE LEAST COST WATS CARRIER

This option will determine which carrier is the least costly for your existing network. The carriers used are MCI, SPRINT, SBS Skyline, and AT&T. You must provide information on your current configuration for each line as follows:

(1) Average hours billed each month.
(2) WATS band.
(3) WATS in or out.
(4) Percentage of calls to metropolitan areas.

DO YOU WISH TO CONTINUE WITH THIS OPTION (Y/N)? N

FIGURE 3-5

MCI and SPRINT have two rate tables: one for calls that utilize only their facilities, such as large cities, and one for calls that must also utilize AT&T facilities, such as rural areas. The default values for MCI and SPRINT are 80% ON-NET (metropolitan) and 20% OFF-NET (rural).

Press any key to continue...

FIGURE 3-6

SBS Skyline has all WATS band calls over a single access channel rather than a separate line for different bands of service. Consequently, their rate tables take into account where the destination of the call is for billing purposes. SBS rates are based on a four tier structure as follows:

TIER 1 - Major metropolitan areas.
TIER 2 - Includes additional frequently called cities.
TIER 3 - Includes remainder of contiguous US, Puerto Rico, and the Virgin Islands.
TIER 4 - Equivalent WATS band 1 coverage of bordering states.

Default values for SBS Skyline are 65%/20%/10%/5% for TIERs 1 through 4 respectively. If your calling patterns are unusual, then enter different values. For example, a stock brokerage would have close to 100% of its calls to metropolitan areas and a farm implement company mostly to rural areas.

Press any key to continue...

FIGURE 3-7

PRESS RETURN KEY TO USE DEFAULT VALUES OR ENTER YOUR OWN.

MCI & SPRINT METROPOLITAN PERCENTAGE: 80

SBS SKYLINE TIER 1: 65

SBS SKYLINE TIER 2: 20

SBS SKYLINE TIER 3: 10

FIGURE 3-8

PRESS RETURN KEY TO USE DEFAULT VALUES OR ENTER YOUR OWN.

MCI & SPRINT METROPOLITAN PERCENTAGE: 80

SBS SKYLINE TIER 1: 65

SBS SKYLINE TIER 2: 20

SBS SKYLINE TIER 3: 10

SBS SKYLINE TIER 4: 5

Press any key to continue...

FIGURE 3-9

ENTER INFORMATION FOR EACH WATS BAND YOU CURRENTLY HAVE.

WATS BAND (1 THRU 6):

FIGURE 3-10

```
ENTER INFORMATION FOR EACH WATS BAND YOU CURRENTLY HAVE.

                    WATS BAND (1 THRU 6): 1

                IS THIS AN OUT WATS (T/F)? T

                      NUMBER OF LINES:  2

     AVERAGE HOURS BILLED PER LINE PER MONTH:
                                    DAY:  45.00
                                EVENING:  12.00
                          NIGHT/WEEKEND:   5.00

     IS THIS YOUR LAST ENTRY (T/F)? F
```

FIGURE 3-11

```
ENTER INFORMATION FOR EACH WATS BAND YOU CURRENTLY HAVE.

                    WATS BAND (1 THRU 6): 1

                IS THIS AN OUT WATS (T/F)? T

                      NUMBER OF LINES:  2

     AVERAGE HOURS BILLED PER LINE PER MONTH:
                                    DAY:  45.00
                                EVENING:  12.00
                          NIGHT/WEEKEND:   5.00

     IS THIS YOUR LAST ENTRY (T/F)? F

DOUBLE CHECK YOUR ENTRIES AND MAKE CORRECTIONS ON THE
NEXT SCREEN.
     PRESS <Ctrl><End> WHEN FINISHED.
Press any key to continue...
```

FIGURE 3-12

```
Record No.       1     NOWNET
-------------------------------------------------------------------------
:CURSOR   <-- --> :          UP  DOWN :    DELETE  : Insert Mode  Ins :
: Char:   <-- --> : Record:   ↑    ↓   : Char:  Del : Exit        ^End :
: Field: Home End : Page:  PgUp PgDn  : Field: ^Y  : Abort         Esc :
: Pan:    ^<- ^-> :                   : Record: ^U : Set Options ^Home:
-------------------------------------------------------------------------
BAND OUT QUANTITY USE_DAY USE_EVE USE_NIGHT
   1 T          2   45.00   12.00      5.00
   3 T          1   89.00   45.00     12.00
   5 T          3  123.00   33.00     26.00
   5 F          1   67.00    2.00      2.00
```

FIGURE 3-13

WAIT A MINUTE WHILE I DO SOME FIGURING.

FIGURE 3-14

-1- DISPLAY RESULTS ON SCREEN

-2- PRINT OUT THE RESULTS

-0- FINISHED

CHOOSE ONE:

FIGURE 3-15

Suboption 1 - Display Results on Screen

Explanatory information appears as in Fig. 3-16 followed by reports of the results. If there are outgoing WATS lines, five reports will be generated as in Figs. 3-17 through 3-22. The percentage of on-net/off-net traffic entered appears at the top of each MCI and SPRINT report and the SBS Skyline percentages appear in that report. Fig. 3-22 shows a summary of all the carriers' outgoing WATS cost in order to select the lowest cost carrier for the current network. If there are incoming WATS lines, one report will be generated as in Fig. 3-23. Upon completion, the menu again appears as in Fig. 3-24.

A report summary will be displayed for each carrier plus a comparison report of all the carriers. The display will wait between reports. Press <Ctrl><S> to stop the scrolling. Press <Ctrl><S> again to resume.

Press any key to continue...

FIGURE 3-16

12/23/85

AT&T OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
1	2	45.00	1452.80	12.00	275.52	5.00	61.40	75.30	1865.02
3	1	89.00	1376.19	45.00	494.70	12.00	77.28	37.65	1985.82
5	3	123.00	5719.05	33.00	1191.06	26.00	532.74	112.95	7555.80
*** Total ***									
	6		8548.04		1961.28		671.42	225.90	11406.64

Press any key to continue...G

Access charge is $ 37.65 per line.
Connection charge is $222.00 for the first line and
$123.00 for each successive line.
Total connection charge for this configuration is $ 837.00.
Press any key to continue...

Figure 3-17

12/23/85

MCI OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
1	2	45.00	1122.78	12.00	270.58	5.00	60.08	200.00	1653.44
3	1	89.00	1111.46	45.00	477.46	12.00	75.60	100.00	1764.52
5	3	123.00	4826.25	33.00	1149.96	26.00	521.04	300.00	6797.25
*** Total ***									
	6		7060.49		1898.00		656.72	600.00	10215.21

Press any key to continue...J

Access charge is $100.00 per line.
Connection charge is $120.00 per line.
Total connection charge for this configuration is $ 720.00.
Minimum usage charge is $ 75.00 per line exclusive of access charges.
Press any key to continue...

Figure 3-18

Page No. 1 80% ON-NET/ 20% OFF-NET
12/23/85

SPRINT OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
1	2	45.00	1277.48	12.00	260.21	5.00	63.16	150.00	1750.85
3	1	89.00	1171.88	45.00	511.20	12.00	80.06	75.00	1838.14
5	3	123.00	5055.71	33.00	1179.88	26.00	539.91	225.00	7000.50
*** Total ***									
	6		7505.07		1951.29		683.13	450.00	10589.49

Press any key to continue...6

Figure 3-19

Access charge is $ 75.00 per line.
Connection charge is $ 75.00 per line.
Total connection charge for this configuration is $ 450.00.
Press any key to continue...

Page No. 1
12/23/85

SBS SKYLINE OUT WATS
MONTHLY COST SUMMARY

TIER	% LINES	# LINES	DAY HRS/ LINE	DAY ($)	OTHER HRS/ LINE	OTHER ($)	TOTAL ($)
1	65	6	59.37	4511.63	29.03	1149.72	5661.35
2	20	6	18.27	1523.66	8.93	418.08	1941.74
3	10	6	9.13	929.19	4.47	281.72	1210.91
4	5	6	4.57	414.78	2.23	131.86	546.64
*** Total ***							
	100		91.33	7379.26	44.67	1981.38	9360.64

Press any key to continue...

Figure 3-20

```
     4   5     6        4.57    414.78        2.23     131.86      546.64
  *** Total ***
       100              91.33   7379.26       44.67    1981.38     9360.64

Press any key to continue...6


    Access charge is $100.00 per line.
    Total monthly access charge for this configuration is $ 600.00.
    Minimum usage charge is $400.00if average use is less than  50 hours/line.
    Total monthly cost for this configuration is $    9960.64.
    Connection charges per line are based on the distance between your
    exchange carrier wire center and the SBS Skyline WATS access point.


DISTANCE          COST
 0-1  mile       85.00
 2-15 miles     100.00
16-25 miles     125.00
26-35 miles     150.00
36-50 miles     175.00

Press any key to continue...
```

Figure 3-21

```
    Page No.     1
    12/23/85
                                  OUT WATS
                          MONTHLY COST COMPARISON
                                BY BAND

                      DAY       EVE       NIGHT      AT&T       MCI       SPRINT
                  #   HRS/      HRS/      HRS/       TOTAL      TOTAL     TOTAL
    BAND LINES    LINE      LINE      LINE       ($)        ($)       ($)


       1     2   45.00     12.00      5.00     1865.02    1653.44    1750.85
       3     1   89.00     45.00     12.00     1985.82    1764.52    1838.14
       5     3  123.00     33.00     26.00     7555.80    6797.25    7000.50
  *** Total ***
             6                                11406.64   10215.21   10589.49


    SBS Skyline total monthly cost is $    9960.64.
Press any key to continue...
```

Figure 3-22

Page No. 1
12/23/85

AT&T IN WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
5	1	67.00	1147.80	2.00	25.60	2.00	13.66	37.65	1224.71
*** Total ***									
	1		1147.80		25.60		13.66	37.65	1224.71

Press any key to continue...F

Access charge is $ 42.80 per line.
Connection charge is $222.00 for the first line and
$123.00 for each successive line.
Total connection charge for this configuration is $ 345.00.
Press any key to continue...

Figure 3-23

-1- DISPLAY RESULTS ON SCREEN.

-2- PRINT OUT THE RESULTS.

-0- FINISHED.

CHOOSE ONE:

Figure 3-24

Suboption 2 - Print Out the Results

Upon selecting this option, the screen appears as in Fig. 3-25. If no printer is connected or the printer is turned off, an error message will appear as in Fig. 3-26. To correct, turn on the printer and press <R>. WARNING! DO NOT PRESS <A>! THIS WILL ABORT THE PROGRAM AND ALL DATA JUST ENTERED PLUS THE RESULTS WILL BE LOST! Just be sure you have a printer connected if you select suboption 2.

Individual reports will be printed as in Figs. 3-27 through 3-32. Upon completion, the screen will again return to the menu as in Fig. 3-33.

```
          ALIGN PAPER AND TURN ON PRINTER
Press any key to continue...
```

FIGURE 3-25

```
Write fault error writing device PRN
  Abort, Retry, Ignore?
```

FIGURE 3-26

Page No. 1
12/23/85

AT&T OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
1	2	45.00	1452.80	12.00	275.52	5.00	61.40	75.30	1865.02
3	1	89.00	1376.19	45.00	494.70	12.00	77.28	37.65	1985.82
5	3	123.00	5719.05	33.00	1191.06	26.00	532.74	112.95	7555.80
*** Total ***									
	6		8548.04		1961.28		671.42	225.90	11406.64

Access charge is $ 37.65 per line.

Connection charge is $222.00 for the first line and
$123.00 for each successive line.

Total connection charge for this configuration is $ 837.00.

Figure 3-27

Page No. 1 80% ON-NET/ 20% OFF-NET
12/23/85

MCI OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
1	2	45.00	1122.78	12.00	270.58	5.00	60.08	200.00	1653.44
3	1	89.00	1111.46	45.00	477.46	12.00	75.60	100.00	1764.52
5	3	123.00	4826.25	33.00	1149.96	26.00	521.04	300.00	6797.25
*** Total ***									
	6		7060.49		1898.00		656.72	600.00	10215.21

Access charge is $100.00 per line.

Connection charge is $120.00 per line.

Total connection charge for this configuration is $ 720.00.

Minimum usage charge is $ 75.00 per line exclusive of access charges.

Figure 3-28

Page No. 1 80% ON-NET/ 20% OFF-NET
12/23/85

SPRINT OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
1	2	45.00	1277.48	12.00	260.21	5.00	63.16	150.00	1750.85
3	1	89.00	1171.88	45.00	511.20	12.00	80.06	75.00	1838.14
5	3	123.00	5055.71	33.00	1179.88	26.00	539.91	225.00	7000.50
*** Total ***									
	6		7505.07		1951.29		683.13	450.00	10589.49

Access charge is $ 75.00 per line.

Connection charge is $ 75.00 per line.

Total connection charge for this configuration is $ 450.00.

Figure 3-29

Page No. 1
12/23/85

SBS SKYLINE OUT WATS
MONTHLY COST SUMMARY

TIER	% LINES	#	DAY HRS/ LINE	DAY ($)	OTHER HRS/ LINE	OTHER ($)	TOTAL ($)
1	65	6	59.37	4511.63	29.03	1149.72	5661.35
2	20	6	18.27	1523.66	8.93	418.08	1941.74
3	10	6	9.13	929.19	4.47	281.72	1210.91
4	5	6	4.57	414.78	2.23	131.86	546.64
*** Total ***							
	100		91.33	7379.26	44.67	1981.38	9360.64

Access charge is $100.00 per line.
Total monthly access charge for this configuration is $ 600.00.

Minimum usage charge is $400.00 if average use is less than 50 hours/line.
Total monthly cost for this configuration is $ 9960.64.

Connection charges per line are based on the distance between your exchange carrier wire center and the SBS Skyline WATS access point.

DISTANCE	COST
0-1 mile	85.00
2-15 miles	100.00
16-25 miles	125.00
26-35 miles	150.00
36-50 miles	175.00

Figure 3-30

Page No. 1
12/23/85

OUT WATS
MONTHLY COST COMPARISON
BY BAND

BAND	# LINES	DAY HRS/ LINE	EVE HRS/ LINE	NIGHT HRS/ LINE	AT&T TOTAL ($)	MCI TOTAL ($)	SPRINT TOTAL ($)
1	2	45.00	12.00	5.00	1865.02	1653.44	1750.85
3	1	89.00	45.00	12.00	1985.82	1764.52	1838.14
5	3	123.00	33.00	26.00	7555.80	6797.25	7000.50
*** Total	***						
	6				11406.64	10215.21	10589.49

SBS Skyline total monthly cost is $ 9960.64.

Figure 3-31

Page No. 1
12/23/85

AT&T IN WATS
MONTHLY COST SUMMARY

BAND	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
5	1	67.00	1147.80	2.00	25.60	2.00	13.66	37.65	1224.71
*** Total ***									
	1		1147.80		25.60		13.66	37.65	1224.71

Access charge is $ 42.80 per line.

Connection charge is $222.00 for the first line and
$123.00 for each successive line.

Total connection charge for this configuration is $ 345.00.

Figure 3-32

-1- DISPLAY RESULTS ON SCREEN

-2- PRINT OUT THE RESULTS

-0- FINISHED

CHOOSE ONE:

FIGURE 3-33

Suboption 0 - Finished

Upon selecting this option, Fig. 3-34 appears. The default is "Y." Anything other than "N" will cause the results to be saved. Fig. 3-35 appears with a list of the current filenames. The filename where the results are to be stored is entered as in Fig 3-36 (note that ".DBF" is not entered as part of the filename). Upon completion, the main menu reappears as in Fig. 3-37.

```
DO YOU WISH TO SAVE THESE RESULTS FOR LATER USE (Y/N)?  Y
```

FIGURE 3-34

```
Filenames can have up to eight letters and/or numbers,
must begin with a letter, and can have no imbedded
blanks.

EXISTING FILENAMES ARE:

ONE.DBF         TWO.DBF         THREE.DBF       FOUR.DBF

      184342 bytes in       4 files.
     123904 bytes remaining on drive.

ENTER FILENAME WHERE RESULTS ARE TO BE STORED:
```

FIGURE 3-35

```
Filenames can have up to eight letters and/or numbers,
must begin with a letter, and can have no imbedded
blanks.

EXISTING FILENAMES ARE:
ONE.DBF         TWO.DBF         THREE.DBF       FOUR.DBF

     18432 bytes in       4 files.
123904 bytes remaining on drive.


     ENTER FILENAME WHERE RESULTS ARE TO BE STORED: FIVE
```

FIGURE 3-36

```
     MAIN MENU


     - 1 - DETERMINE LEAST COST WATS CARRIER FOR CURRENT NETWORK
     - 2 - OPTIMIZE CURRENT NETWORK FOR WATS CARRIER
     - 3 - LOAD NEW CARRIER RATE TABLES
     - 4 - VIEW EXISTING RESULT FILES
     - 5 - DELETE EXISTING FILE


     - 0 - FINISHED


     CHOOSE ONE:
```

FIGURE 3-37

Option 2 - Optimize Current Network for WATS Carrier

Upon selecting this option, the screen appears as in Fig. 3-38. The default again is "N" with any response other than "Y" returning to the main menu. In Fig. 3-39 the screen displays the current configuration files which already exist so the user can pick one. If the user changes his mind and doesn't want any of the files listed, he can press <Return> to return to the main menu. After a file is selected as in Fig. 3-40, Fig. 3-41 will appear on the screen if the configuration has outgoing WATS lines.

Data for each WATS band is entered just as in Option 1. The computer will compute the grade of service for each of the existing trunks and display the results as in Fig. 3-42. The user can now optimize his network for the existing grade of service or choose his own. A value less than 1 or greater than 50 will not be accepted. If attempted, Fig. 3-43 will appear. Once a valid grade of service is entered, Fig. 3-44 followed by 3-45 will appear. This will appear for each band through the highest band trunk in the configuration. After data for the last band is entered, the screen will be similar to Fig. 3-46.

When computations to optimize the configuration begin, Fig. 3-47 will appear. The time displayed will vary from a minimum of 5 minutes for only band 1 trunks to a maximum of one hour for band 6 trunks.

If the configuration has incoming WATS lines, screens similarly will appear as shown is Figs. 3-48 through 3-51. Maximum time in Fig. 3-51 is 30 minutes for band 6 trunks. After all computations are complete, the results are stored and Fig. 3-52 appears to select output.

OPTIMIZE CURRENT NETWORK

This option will determine the number of trunks you need for each band in your network optimized for least cost for each carrier. Information is utilized from the present network which was entered in option <1> DETERMINE LEAST COST WATS CARRIER. To optimize your network requires a call recording device on each of your WATS lines to determine your actual calling patterns. You must provide the busy hour traffic for each WATS band.

Also, you must provide the "P" value required for your lines. A value of "P10" means that during the busy hour, 10 percent of the calls attempted will receive a busy signal on the first attempt. The lower the "P" value, the better the availability of lines; however, it requires more trunks at a higher expense. The default value is the highest "P" value of your present network.

DO YOU WISH TO CONTINUE WITH THIS OPTION (Y/N)? N

FIGURE 3-38

EXISTING RESULT FILES ARE:

ONE.DBF TWO.DBF THREE.DBF FOUR.DBF

20480 bytes in 4 files.
121856 bytes remaining on drive.

CHOOSE ONE:

FIGURE 3-39

```
EXISTING RESULT FILES ARE:

ONE.DBF         TWO.DBF         THREE.DBF       FOUR.DBF

 20480 bytes in      4 files.
121856 bytes remaining on drive.

                                        CHOOSE ONE:
```

FIGURE 3-40

```
ENTER TOTAL PEAK HOUR OUT WATS TRAFFIC IN MINUTES FOR
EACH BAND:

     BAND1:     0.0

     BAND2:     0.0

     BAND3:     0.0

     BAND4:     0.0

     BAND5:     0.0
```

FIGURE 3-41

```
ENTER TOTAL PEAK HOUR OUT WATS TRAFFIC IN MINUTES FOR
EACH BAND:

     BAND1:    65.0                  BAND1 TRUNKS:  P30

     BAND2:    10.0                  BAND3 TRUNKS:  P34

     BAND3:    15.0                  BAND5 TRUNKS:  P20

     BAND4:    40.0

     BAND5:    50.0

PRESS RETURN KEY TO USE DEFAULT "P"  VALUE OR ENTER YOUR
OWN: 34
```

FIGURE 3-42

```
ENTER TOTAL PEAK HOUR OUT WATS TRAFFIC IN MINUTES FOR
EACH BAND:

     BAND1:   65.0                  BAND1 TRUNKS:  P30

     BAND2:   10.0                  BAND3 TRUNKS:  P34

     BAND3:   15.0                  BAND5 TRUNKS:  P20

     BAND4:   40.0

     BAND5:   50.0

PRESS RETURN KEY TO USE DEFAULT "P"  VALUE OR ENTER YOUR
OWN: 34

"P" VALUE MUST BE 1 THRU 50.  REENTER VALUE.
```

FIGURE 3-43

```
ENTER TOTAL PEAK HOUR OUT WATS TRAFFIC IN MINUTES FOR
EACH BAND:

     BAND1:   65.0                  BAND1 TRUNKS:  P30

     BAND2:   10.0                  BAND3 TRUNKS:  P34

     BAND3:   15.0                  BAND5 TRUNKS:  P20

     BAND4:   40.0

     BAND5:   50.0

PRESS RETURN KEY TO USE DEFAULT "P"  VALUE OR ENTER YOUR
OWN: 34

"P" VALUE MUST BE 1 THRU 50.  REENTER VALUE.

Press any key to continue...
```

FIGURE 3-44

```
ENTER ACTUAL MEASURED TRAFFIC IN HOURS PER MONTH:

BAND1:
          DAY:      .
      EVENING:      .
NIGHT/WEEKEND:      .
```

FIGURE 3-45

```
ENTER ACTUAL MEASURED TRAFFIC IN HOURS PER MONTH:

BAND5:
          DAY:    69.00
      EVENING:    19.00
NIGHT/WEEKEND:     8.00

Press any key to continue...
```

FIGURE 3-46

```
COME BACK IN 30 MINUTES.
```

FIGURE 3-47

```
ENTER TOTAL PEAK HOUR IN WATS TRAFFIC IN MINUTES FOR EACH
BAND:

     BAND1:     5.0              BAND5 TRUNKS:        P40
     BAND2:     5.0
     BAND3:     5.0
     BAND4:     5.0
     BAND5:    10.0

PRESS RETURN KEY TO USE DEFAULT "P" VALUE OR ENTER YOUR
OWN: 40
```

FIGURE 3-48

```
ENTER TOTAL PEAK HOUR IN WATS TRAFFIC IN MINUTES FOR EACH
BAND:

     BAND1:     5.0              BAND5 TRUNKS:        P40
     BAND2:     5.0
     BAND3:     5.0
     BAND4:     5.0
     BAND5:    10.0

PRESS RETURN KEY TO USE DEFAULT "P" VALUE OR ENTER YOUR
OWN: 40

Press any key to continue...
```

FIGURE 3-49

ENTER ACTUAL MEASURED TRAFFIC IN HOURS PER MONTH:

BAND5

DAY:	10.00
EVENING:	0.25
NIGHT/WEEKEND:	0.25

Press any key to continue...

FIGURE 3-50

TAKE A 15 MINUTE BREAK WHILE I DO SOME WORK.

FIGURE 3-51

-1- DISPLAY RESULTS ON SCREEN.

-2- PRINT OUT THE RESULTS.

-0- FINISHED.

CHOOSE ONE:

FIGURE 3-52

Suboption 1 - Display Results on Screen

Fig. 3-53 is displayed followed by Figs. 3-55 through 3-59. The grade of service is included in the heading of each report. The data used to optimize the configuration is included in the last reports for outgoing and incoming WATS carriers.

Suboption 2 - Print Out the Results

Fig. 3-54 is displayed followed by the printing of Figs. 3-55 through 3-59.

Suboption 0 - Finished

The program returns to the main menu as in Fig. 3-60.

OPTIMIZED RESULTS

A report summary will be displayed for each carrier.
The display will wait between reports. Press <Ctrl><S>
to stop the scrolling. Press <Ctrl><S> again to resume.

Press any key to continue...

FIGURE 3-53

OPTIMIZED RESULTS

Align Paper and Turn on Printer

Press any key to continue...

FIGURE 3-54

Page No. 1 OPTIMIZED CONFIGURATION: P20
12/23/85

AT&T OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
4	4	119.75	7164.14	37.25	1710.46	23.00	603.52	150.60	9628.72
5	3	23.00	1306.53	6.33	243.07	2.67	54.71	112.95	1717.26
*** Total ***									
	7		8470.67		1953.53		658.23	263.55	11345.98

Access charge is $ 37.65 per line.

Connection charge is $222.00 for the first line and
$123.00 for each successive line.

Total connection charge for this configuration is $ 960.00.

Figure 3-55

Page No. 1 OPTIMIZED CONFIGURATION: P20
(80% ON-NET/ 20% OFF-NET)

12/23/85

MCI OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
4	4	119.75	5899.16	37.25	1648.07	23.00	590.46	400.00	8537.69
5	3	23.00	1051.15	6.33	238.63	2.67	53.51	300.00	1643.29
*** Total ***									
	7		6950.31		1886.70		643.97	700.00	10180.98

Access charge is $100.00 per line.

Connection charge is $120.00 per line.

Total connection charge for this configuration is $ 840.00.

Minimum usage charge is $ 75.00 per line exclusive of access charges.

Figure 3-56

Page No. 1

OPTIMIZED CONFIGURATION: P20
(80% ON-NET/ 20% OFF-NET)

12/23/85

SPRINT OUT WATS
MONTHLY COST SUMMARY

BAND	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	TOTAL ($)
1	5	18.00	1311.84	4.80	260.21	2.00	63.16	1635.21
2	5	16.00	1176.48	8.00	436.08	2.00	63.60	1676.16
3	5	1.80	137.38	1.00	56.80	0.40	13.34	207.52
4	5	60.00	4345.40	16.00	938.08	14.00	472.50	5755.98
5	5	13.80	1110.08	3.80	226.44	1.60	55.37	1391.89
*** Total ***			8081.18		1917.61		667.97	10666.76

Access charge is $ 75.00 per line.
Total monthly access charge for this configuration is $ 375.00.

Connection charge is $ 75.00 per line.
Total connection charge for this configuration is $ 375.00.

Total monthly cost for this configuration is $ 11041.76.

Figure 3-57

Page No. 1 OPTIMIZED CONFIGURATION: P20
12/23/85

SBS SKYLINE OUT WATS
MONTHLY COST SUMMARY

TIER	% LINES	#	DAY HRS/ LINE	DAY ($)	OTHER HRS/ LINE	OTHER ($)	TOTAL ($)
1	65	5	71.24	4430.42	34.84	1149.72	5580.14
2	20	5	21.92	1494.07	10.72	418.08	1912.15
3	10	5	10.96	912.42	5.36	276.74	1189.16
4	5	5	5.48	406.56	2.68	129.20	535.76
*** Total ***							
	100		109.60	7243.47	53.60	1973.74	9217.21

Access charge is $100.00 per line.
Total monthly access charge for this configuration is $ 500.00.

Minimum usage charge is $400.00 if average use is less than 50 hours/line.
Total monthly cost for this configuration is $ 9717.21.

Connection charges per line are based on the distance between your exchange carrier wire center and the SBS Skyline WATS access point.

DISTANCE	COST
0-1 mile	85.00
2-15 miles	100.00
16-25 miles	125.00
26-35 miles	150.00
36-50 miles	175.00

	OUT WATS BUSY HOUR TRAFFIC (Minutes)	OUT WATS MONTHLY TRAFFIC (Hours) DAY	EVENING	NIGHT/WEEKEND
BAND 1	65.0	90.00	24.00	10.00
BAND 2	10.0	80.00	40.00	10.00
BAND 3	15.0	9.00	5.00	2.00
BAND 4	40.0	300.00	80.00	70.00
BAND 5	50.0	69.00	19.00	8.00

Figure 3-58

Page No. 1 OPTIMIZED CONFIGURATION: P20
12/23/85

AT&T IN WATS
MONTHLY COST SUMMARY

BAND	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
5	2	33.50	1142.55	1.00	25.80	1.00	17.06	85.60	1271.01
*** Total ***									
	2		1142.55		25.80		17.06	85.60	1271.01

Access charge is $ 42.80 per line.

Connection charge is $222.00 for the first line and
$123.00 for each successive line.

Total connection charge for this configuration is $ 468.00.

	IN WATS BUSY HOUR TRAFFIC (Minutes)	IN WATS MONTHLY TRAFFIC (Hours) DAY	EVENING	NIGHT/WEEKEND
BAND 1	5.0	27.00	1.00	1.00
BAND 2	5.0	10.00	0.25	0.25
BAND 3	5.0	10.00	0.25	0.25
BAND 4	5.0	10.00	0.25	0.25
BAND 5	10.0	10.00	0.25	0.25

Figure 3-59

MAIN MENU

- 1 - DETERMINE LEAST COST WATS CARRIER FOR CURRENT NETWORK

- 2 - OPTIMIZE CURRENT NETWORK FOR WATS CARRIER

- 3 - LOAD NEW CARRIER RATE TABLES

- 4 - VIEW EXISTING RESULT FILES

- 5 - DELETE EXISTING FILE

- 0 - FINISHED

CHOOSE ONE:

FIGURE 3-60

Option 3 - Load New Carrier Rate Tables

Screen displays are shown in Figs. 3-61 through 3-64. In Fig. 3-64, the response should be "Y" and press <Return>. This erases the rate tables from the dBASE III disk which was used as a temporary storage place.

LOAD NEW CARRIER RATE TABLES

This option will load new carrier rate tables onto the OPTICOM program as well as any new parameters such as access charges, connection charges, minimum billed, etc. WARNING! OLD TABLES AND PARAMETERS WILL BE ERASED. IF YOU DESIRE TO SAVE THE OLD TABLES OR RUN DATA USING THE OLD TABLES, BE SURE TO MAKE A COPY OF THIS DISK BEFORE PROCEEDING.

DO YOU WISH TO CONTINUE WITH THIS OPTION (Y/N)? N

FIGURE 3-61

WHICH DRIVE IS OPTICOM PROGRAM ON (A/B/C/D)?

WHICH DRIVE IS DBASE III ON (A/B/C/D)?

FIGURE 3-62

```
          WHICH DRIVE IS OPTICOM PROGRAM ON (A/B/C/D)? B

          WHICH DRIVE IS DBASE III ON (A/B/C/D)? A


     REMOVE OPTICOM FLOPPY FROM DRIVE B AND INSERT FLOPPY
     WITH UPDATED TABLES.
Press any key to continue...


B: TABLES AT&TOUT.DBF
B: TABLES AT&TIN.DBF
B: TABLES SPRNTOUT.DBF
B: TABLES SBSOUT.DBF
B: TABLES MCIOUT.DBF
B: TABLES SBSIN.DBF
B: TABLES SBSCONEC.DBF
          7 File(s) copied
B: TABLES CONSTANT.MEM
B: TABLES DATE.MEM
          2 File(s) copied
```

FIGURE 3-63

```
     INSERT FLOPPY WITH OPTICOM PROGRAM IN DRIVE B.
Press any key to continue...

A: TABLES AT&TOUT.DBF
A: TABLES AT&TIN.DBF
A: TABLES SPRNTOUT.DBF
A: TABLES SBSOUT.DBF
A: TABLES MCIOUT.DBF
A: TABLES SBSIN.DBF
A: TABLES SBSCONEC.DBF
A: TABLES CONSTANT.MEM
A: TABLES DATE.MEM
          9 File(s) copied

Are you sure (Y/N)?
```

FIGURE 3-64

Option 4 - View Existing Results Files

Fig. 3-65 shows the screen display which includes the selection made. Again, press the <Return> key rather than make an entry and you will return to the main menu. Fig. 3-52 will appear in order to choose the appropriate output.

Suboption 1 - Display Results on Screen

Figs. 3-16 through 3-23 apply. If the configuration has previously been optimized, Figs. 3-53 and 3-55 through 3-59 will follow. After completion, Fig. 3-52 will appear.

Suboption 2 - Print Out the Results

Figs. 3-25 and 3-27 through 3-32 apply. If previously optimized, Figs. 3-54 through 3-59 will follow. Fig. 3-52 completes this choice.

Suboption 0 - Finished

The screen returns to the main menu as in Fig. 3-60.

```
          EXISTING RESULT FILES ARE:
ONE.DBF        TWO.DBF        THREE.DBF      FOUR.DBF
FIVE.DBF

 20480 bytes in      5 files.
101376 bytes remaining on drive.

DO YOU WISH TO SEE ANY OF THESE FILES (Y/N)? Y
CHOOSE ONE:FIVE
```

FIGURE 3-65

Option 5 - Delete Existing File

Figure 3-66 shows the screen display along with the responses. When complete, the program returns to the main menu.

Option 0 - Finished

This exits the OPTICOM program and returns to the dBASE III dot (.) prompt as in Fig. 3-1.

```
     EXISTING RESULT FILES ARE:
ONE.DBF         TWO.DBF         THREE.DBF       FOUR.DBF
FIVE.DBF

 20480 bytes in       5 files.
101376 bytes remaining on drive.

DO YOU WISH TO DELETE ANY OF THESE FILES (Y/N)? Y
                                    CHOOSE ONE: FIVE
```

FIGURE 3-66

CHAPTER IV

DECISION MAKING WITH THE PROGRAM

Figures 4-1 through 4-6 show the results from actual data obtained for Lowry Air Force Base, Colorado for its WATS lines during the period of July 1985. Detail call recording devices are not used on the lines so an optimization could not be performed; however, looking at the current network output gives valuable information. Traffic patterns do not fluctuate radically from month to month so this can be used as a representative.

As can be seen in Fig. 4-5, approximately $1500 per month could be saved just by switching from AT&T to SPRINT as the long distance carrier. The connection charge of $1125 would be saved in less than one month. First year savings would be $16,875. If detail traffic information were available, the network could be optimized for further possible savings. For example, Fig. 4-1 shows five band 5 lines with low usage of 19.06 hours/line. It may be more cost effective to eliminate these and pass the traffic over the band 6 lines. Only an optimization will show this. There are also possible

savings in Fig. 4-6 on the nine high usage band 5 lines through adding lower band lines.

OPTICOM can be especially valuable for "what if" situations. The cost of projected requirements are immediately available along with the least expensive carrier and configuration. As Chapter 3 showed, the grade of service of the current network is determined to help the user ensure his service is adequate. If the user is dissatified with his grade of service, the optimization will tell him the cost of changing it.

Page No. 1
12/23/85

AT&T DUT MATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
5	1	79.50	1339.67	5.90	75.52	13.30	90.84	37.65	1543.68
5	2	77.30	2611.81	8.50	217.60	11.00	150.26	75.30	3054.97
5	5	78.44	6617.02	9.82	628.48	10.18	347.65	188.25	7781.40
5	5	19.06	1832.41	0.00	0.00	1.80	61.47	188.25	2082.13
6	2	6.20	296.36	0.05	1.55	0.30	5.02	75.30	378.23
*** Total ***									
	15		12697.27		923.15		655.24	564.75	14840.41

Access charge is $ 37.65 per line.

Connection charge is $222.00 for the first line and
$123.00 for each successive line.

Total connection charge for this configuration is $1944.00.

Figure 4-1

Page No. 1 80% ON-NET/ 20% OFF-NET
12/23/85

MCI OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
5	1	79.50	1101.37	5.90	74.14	13.30	88.84	100.00	1364.35
5	2	77.30	2144.70	8.50	213.62	11.00	146.96	200.00	2705.28
5	5	78.44	5436.95	9.82	616.99	10.18	340.02	500.00	6893.96
5	5	19.06	1485.49	0.00	0.00	1.80	60.12	500.00	2045.61
6	2	6.20	200.22	0.05	1.25	0.30	4.01	200.00	405.48
*** Total ***									
	15		10368.73		906.00		639.95	1500.00	13414.68

Access charge is $100.00 per line.

Connection charge is $120.00 per line.

Total connection charge for this configuration is $1800.00.

Minimum usage charge is $ 75.00 per line exclusive of access charges.

Figure 4-2

Page No. 1 80% ON-NET/ 20% OFF-NET
12/23/85

SPRINT OUT WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
5	1	79.50	1123.75	5.90	70.32	13.30	92.06	75.00	1361.13
5	2	77.30	2194.49	8.50	202.61	11.00	152.29	150.00	2699.39
5	5	78.44	5554.91	9.82	585.17	10.18	352.33	375.00	6867.41
5	5	19.06	1533.19	0.00	0.00	1.80	62.30	375.00	1970.49
6	2	6.20	234.58	0.05	1.31	0.30	4.26	150.00	390.15
*** Total ***									
	15		10640.92		859.41		663.24	1125.00	13288.57

Access charge is $ 75.00 per line.

Connection charge is $ 75.00 per line.

Total connection charge for this configuration is $1125.00.

Figure 4-3

Page No. 1
12/23/85

SBS SKYLINE OUT WATS
MONTHLY COST SUMMARY

TIER	%	# LINES	DAY HRS/ LINE	DAY ($)	OTHER HRS/ LINE	OTHER ($)	TOTAL ($)
1	65	15	31.81	6781.50	7.28	720.29	7501.79
2	20	15	9.79	2279.51	2.24	261.92	2541.43
3	10	15	4.89	1370.52	1.12	194.43	1564.95
4	5	15	2.45	616.56	0.56	91.67	708.23
*** Total ***							
	100		48.93	11048.09	11.19	1268.31	12316.40

Access charge is $100.00 per line.
Total monthly access charge for this configuration is $1500.00.

Minimum usage charge is $400.00 if average use is less than 50 hours/line.
Total monthly cost for this configuration is $ 13816.40.

Connection charges per line are based on the distance between your exchange carrier wire center and the SBS Skyline WATS access point.

DISTANCE	COST
0-1 mile	85.00
2-15 miles	100.00
16-25 miles	125.00
26-35 miles	150.00
36-50 miles	175.00

Figure 4-4

Page No. 1
12/23/85

OUT WATS
MONTHLY COST COMPARISON
BY BAND

BAND	# LINES	DAY HRS/ LINE	EVE HRS/ LINE	NIGHT HRS/ LINE	AT&T TOTAL ($)	MCI TOTAL ($)	SPRINT TOTAL ($)
5	1	79.50	5.90	13.30	1543.68	1364.35	1361.13
5	2	77.30	8.50	11.00	3054.97	2705.28	2699.39
5	5	78.44	9.82	10.18	7781.40	6893.96	6867.41
5	5	19.06	0.00	1.80	2082.13	2045.61	1970.49
6	2	6.20	0.05	0.30	378.23	405.48	390.15
*** Total ***							
	15				14840.41	13414.68	13288.57

SBS Skyline total monthly cost is $ 13816.40.

Figure 4-5

Page No. 1
12/23/85

AT&T IN WATS
MONTHLY COST SUMMARY

B A N D	# LNS	DAY HRS/ LINE	DAY ($)	EVE HRS/ LINE	EVE ($)	NIGHT HRS/ LINE	NIGHT ($)	ACCESS ($)	TOTAL ($)
5	6	104.22	9527.25	0.97	75.08	14.67	750.81	256.80	10609.94
5	9	150.47	19747.91	0.07	8.13	12.51	960.39	385.20	21101.63
6	2	3.15	135.45	0.00	0.00	0.10	2.07	85.60	223.12
*** Total ***									
	17		29410.61		83.21		1713.27	727.60	31934.69

Access charge is $ 42.80 per line.

Connection charge is $222.00 for the first line and
$123.00 for each successive line.

Total connection charge for this configuration is $2313.00.

Figure 4-6

CHAPTER V

CONCLUSION

OPTICOM is a valuable tool to be used by a business or government agency to optimize its long distance WATS service for least cost. The program as originally written uses the rate tables for Colorado. Using the program elsewhere requires loading the rate tables for the appropriate state. For a small organization in a few states, this can be done manually using the format of files in Appendix C. If the organization has multiple locations in the state, the tables can be put on a single floppy disk, duplicated, and distributed to each location for updating the program.

This would not be cost effective for an organization that had many locations but only one or two in each state. Manual loading of 50 different tables each time there was an update would be too time consuming. In this case the OPTICOM program could be modified to include the full nation-wide rate table and a configuration option to choose the state. For example, the program would ask "Which state do you want the program configured for?" The response would be a two

letter abbreviation for the state. The program would then select the subset of the nation-wide rate table which applied to that state.

As currently written, OPTICOM requires the user to already own dBASE III software. dBASE III cannot be duplicated so each location would be required to own a copy at approximately $370 through mail order sources. If dBASE III is not required at those locations for any other uses, there is a cheaper alternative. dBASE III compilers are now available for $500 to $750 through mail order. The OPTICOM program could be compiled, then copied and distributed to locations. The only maintenance required would be periodic (every six months) distribution of new rate table floppies at a cost of $5. The original manual load of the new tables would take a person about 1/2 day. Sources for dBASE III software and compilers are provided in Table 5-1.

TABLE 5-1

dBASE III Software and Compiler Sources

SOFTWARE	MANUFACTURED BY	RETAIL
dBASE III	Ashton-Tate 10150 West Jefferson Blvd. Culver City, CA 90230 Phone: 213-329-8000	$695
COMPILERS		
Clipper	Nantucket, Inc. 5995 South Sepulveda Blvd. Culver City, CA 90230 Phone: 213-390-7923	$695
dB III Compiler	Wordtech Systems, Inc. 21 Altarinda Road Orinda, CA 94563 Phone: 415-254-0900	$750

BIBLIOGRAPHY

1. Beckmann, Petr, Introduction to Elementary Queuing Theory and Telephone Traffic, Boulder, CO., Golem Press, 1968.

2. Finefrock, Jerry W., "Poisson Traffic Tables Designed for Practical Use." Business Communications Review. Vol. 4, No. 2, March-April 1974, pp. 3-12.

3. Lewin, Leonard, Telecommunications: An Interdisciplinary Text, Dedham, MA; Artech House, Inc., 1984.

4. Rabb, Michael T., "A Design Algorithm and Computer Program for Optimizing Single-Node, Long Distance Networks," Boulder, CO: University of Colorado College of Engineering, 1983.

APPENDIX A

OPTICOM PROGRAM FLOWCHARTS

This appendix contains a hierarchical representation of program module dependencies along with a description of each module.

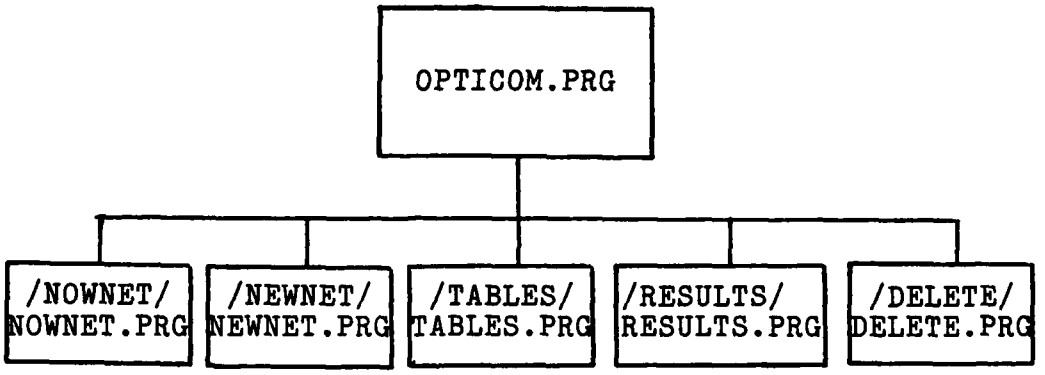


FIGURE A-1. Program Heirarchy Level 1.

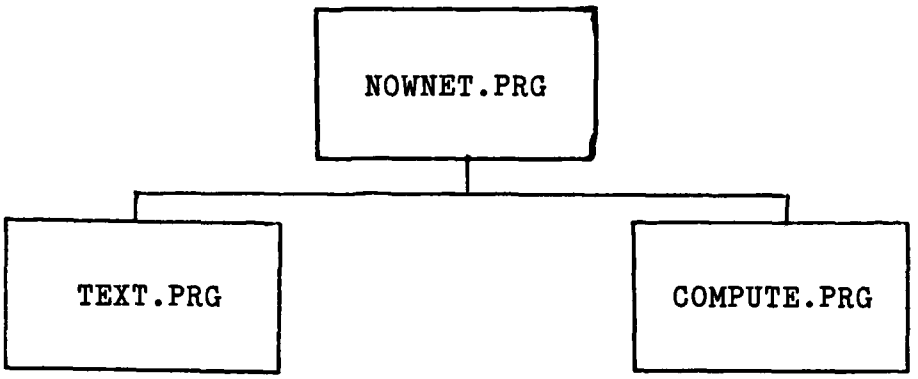


FIGURE A-2. Program Hierarchy Level 2, NOWNET.

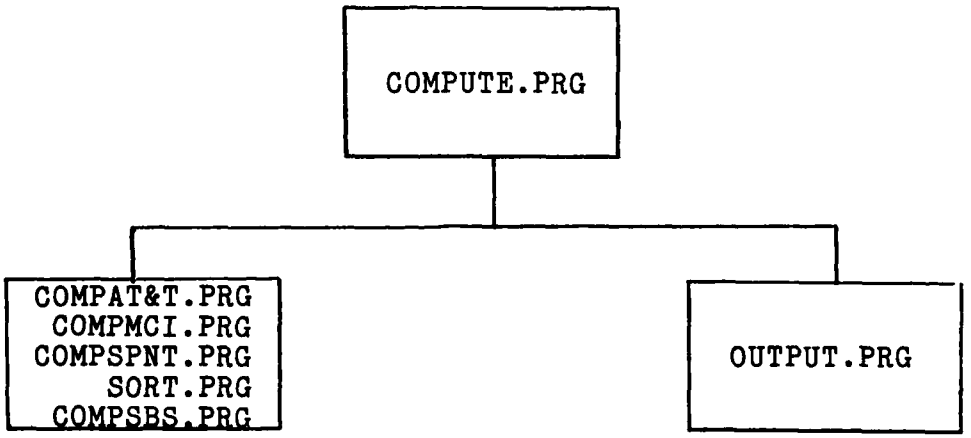


FIGURE A-3. Program Hierarchy Level 3, NOWNET.

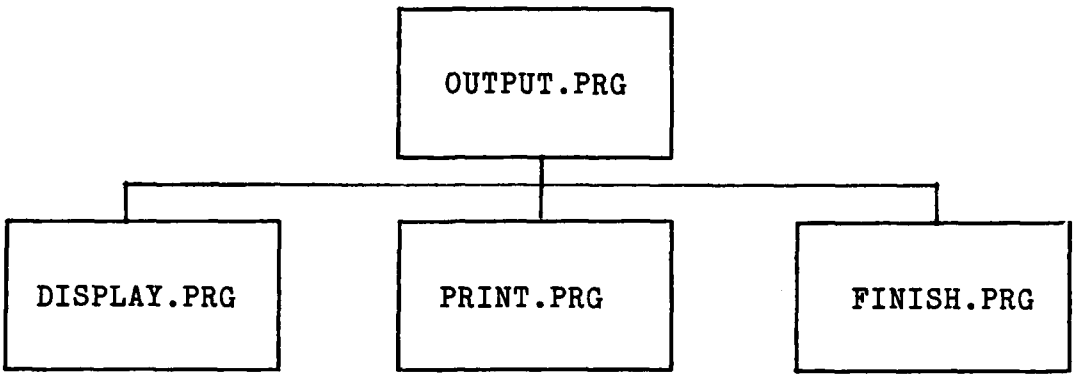


FIGURE A-4. Program Hierarchy Level 4, NOWNET.

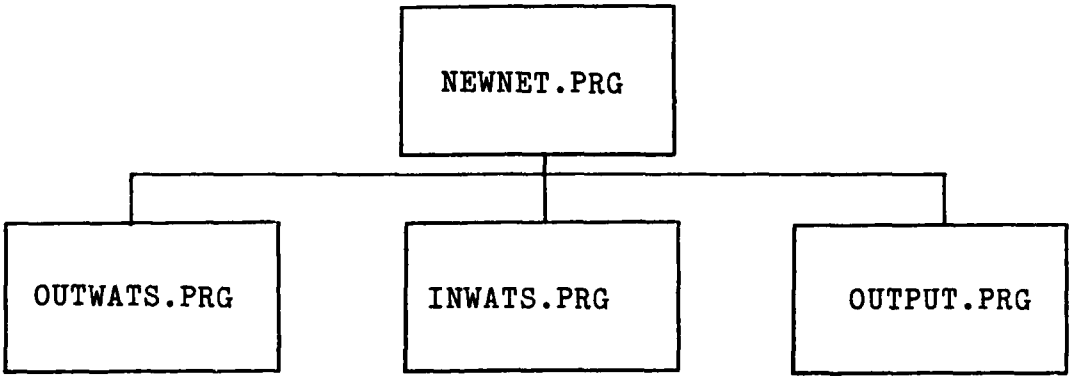


FIGURE A-5. Program Heirarchy Level 2, NEWNET.

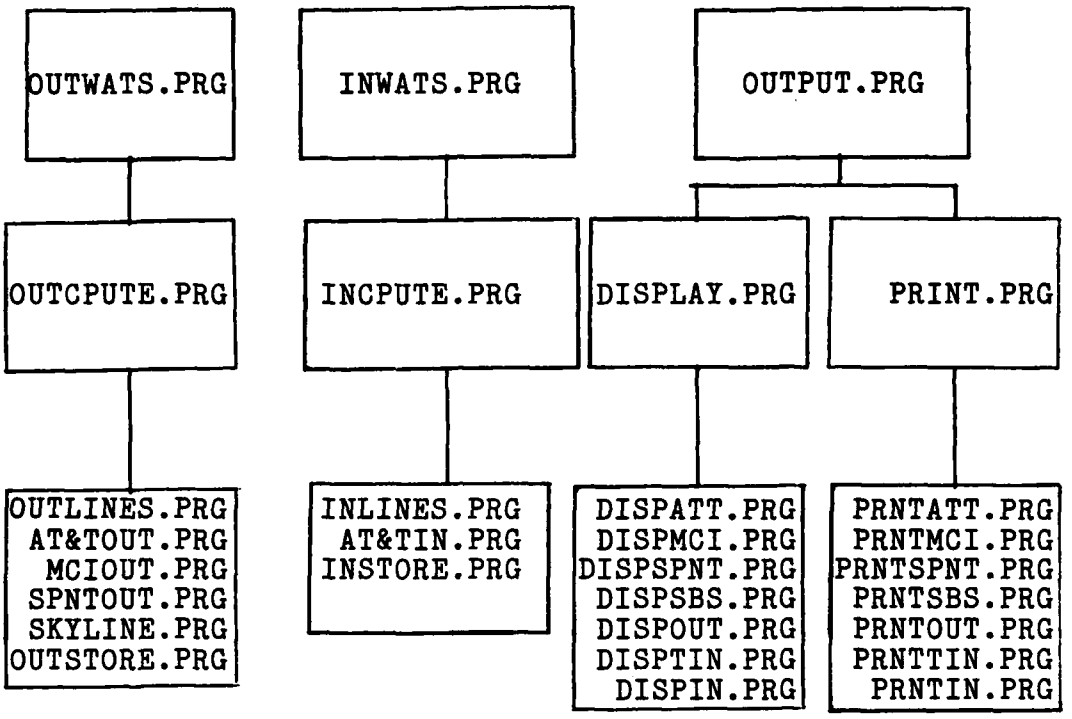


FIGURE A-6. Program Hierarchy Levels 3 and 4, NEWNET.

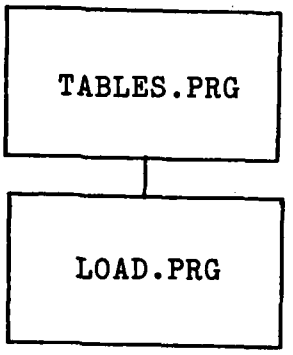


FIGURE A-7. Program Hierarchy Level 2, TABLES.

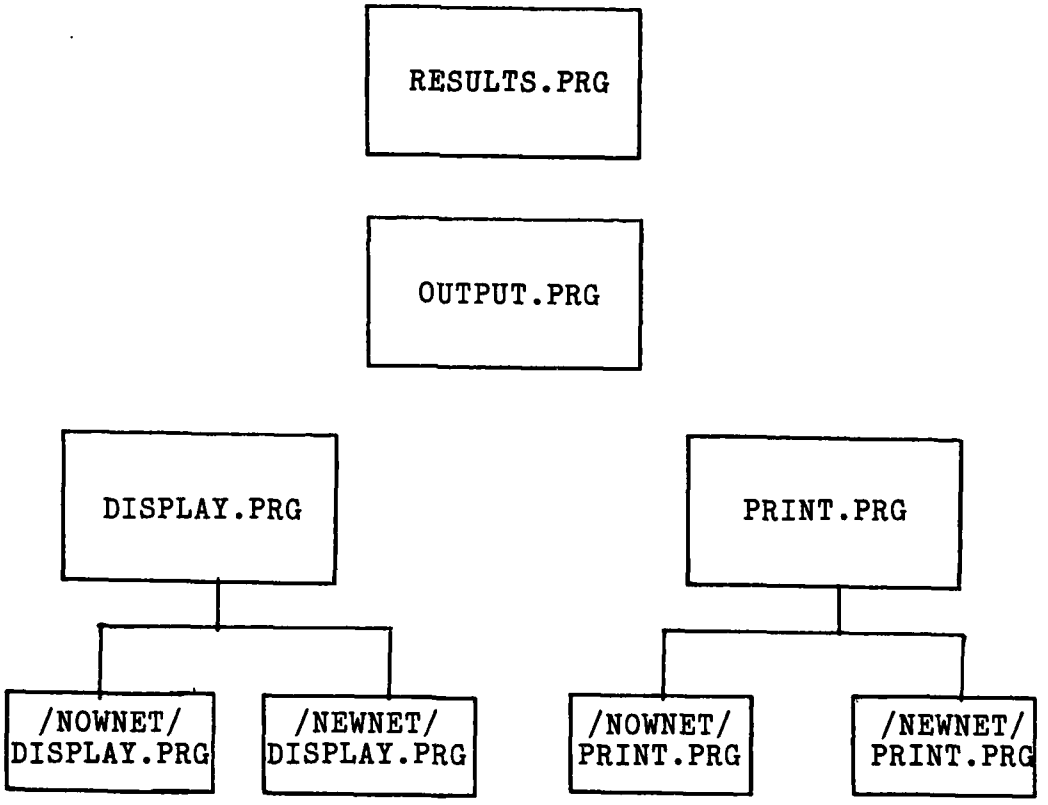


FIGURE A-8. Program Hierarchy Levels 3 and 4, RESULTS.

Module Descriptions

/DELETE/ Directory Modules

1. DELETE.PRG - Controls removal of files containing results of network configuration costs and optimizations.

/NEWNET/ Directory Modules

1. AT&TIN.PRG - Calculates the cost of each configuration possible for the incoming WATS traffic in order to find the optimum AT&T solution.
2. AT&TOUT.PRG - Calculates the cost of each configuration possible for the outgoing WATS traffic in order to find the optimum AT&T solution.
3. DISPATT.PRG - Displays the optimum AT&T solution for outgoing WATS traffic.
4. DISPIN.PRG - Displays data which was input and used to optimize the incoming WATS traffic.
5. DISPLAY.PRG - Controls screen displays of optimum configurations for all carriers.
6. DISPMCI.PRG - Displays the optimum MCI solution for outgoing traffic.
7. DISPOUT.PRG - Displays data which was input and used to optimize the outgoing WATS traffic.
8. DISPSBS.PRG - Displays the optimum SBS Skyline solution for outgoing traffic.

9. DISPSPNT.PRG - Displays the optimum GTE SPRINT solution for outgoing traffic.
10. DISPTIN.PRG - Displays the optimum AT&T solution for incoming WATS traffic.
11. INCPUTE.PRG - Controls selection of possible configurations and computations in order to find optimum solution for AT&T incoming WATS traffic.
12. INLINES.PRG - Computes the number of incoming lines of each band required for each configuration in order to meet the customer's service requirement.
13. INSTORE.PRG - Stores the optimal solution for the AT&T incoming WATS traffic in the /RESULTS/ directory.
14. MCIOUT.PRG - Same as #2 for MCI.
15. NEWNET.PRG - Controls all functions to optimize the current network based on data provided by the user.
16. OUTLINES.PRG - Computes the number of outgoing lines of each band required for each configuration in order to meet the customer's service requirement.
17. OUTPUT.PRG - Controls all output of optimized solutions.
18. OUTSTORE.PRG - Stores the optimal solution for outgoing WATS traffic for each carrier in the /RESULTS/ directory.

19. PRINT.PRG - Controls the printing of optimum solutions for all carriers.
20. PRNTATT.PRG - Same as #3 to the printer.
21. PRNTIN.PRG - Same as #4 to the printer.
22. PRNTMCI.PRG - Same as #6 to the printer.
23. PRNTOUT.PRG - Same as #7 to the printer.
24. PRNTSBS.PRG - Same as #8 to the printer.
25. PRNTSPNT.PRG - Same as #9 to the printer.
26. PRNTTIN.PRG - Same as #10 to the printer.

/NOWNET/ Directory Modules

1. COMPAT&T.PRG - Computes the AT&T cost of the present network.
2. COMPMCI.PRG - Computes the MCI cost of the present outgoing WATS configuration.
3. COMPSBS.PRG - Same as #2 for SBS Skyline.
4. COMPSPNT.PRG - Same as #2 for GTE SPRINT.
5. COMPUTE.PRG - Controls all computations of cost for the current network.
6. DISPLAY.PRG - Controls all screen displays of current network costs for each carrier.
7. FINISH.PRG - Stores the current network costs for all carriers in a /RESULTS/ directory file specified by the user, then returns to the main menu.
8. NOWNET.PRG - Controls all functions to determine current network costs.

9. OUTPUT.PRG - Controls all output for the current network.
10. PRINT.PRG - Controls the printing of current network costs for each carrier.

/RESULTS/ Directory Modules

1. DISPLAY.PRG - Controls screen displays of all results.
2. PRINT.PRG - Controls printing of all results.
3. OUTPUT.PRG - Controls all output.
4. RESULTS.PRG - Retrieves a file specified by the user in order to look at the results of a configuration previously run through the program.

/TABLES/ Directory Modules

1. LOAD.PRG - Loads new carrier rate tables into the OPTICOM program.
2. TABLES.PRG - Provides explanatory information to the user and controls the loading of new tables.

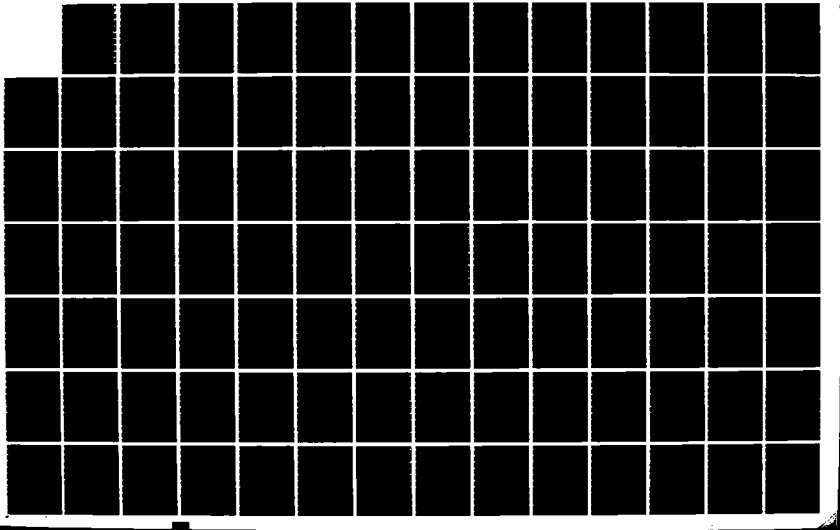
APPENDIX B

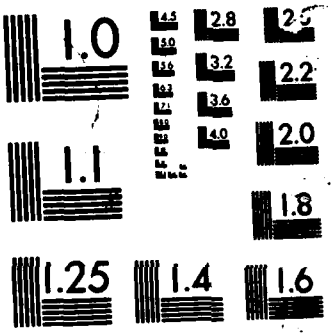
OPTICOM PROGRAM CODE

```
TYPE OPTICOM.PRG



CLEAR ALL
SET TALK OFF
SET DEFAULT TO B:
SET MENU ON
STORE 'N' TO CHOICE
CLEAR
@ 10,20 SAY 'ARE YOU USING A COLOR MONITOR (Y/N)?' GET CHOICE     PICTURE '!'
READ

IF CHOICE = 'Y'
    SET COLOR TO 7/1,1/7,4
ELSE
    SET COLOR TO 7/0,0/7,0
ENDIF

CLEAR
RESTORE FROM \TABLES\DATE
? '        OPTICOM VERSION 1.00        ' + 'RATE TABLES AS OF:  ' + DATE
? '        DECEMBER 2, 1985'
? '        STEPHEN A. DRAPER'
?
?
?
? '           OPTICOM is a software package designed to aid you, the'
? '        communications manager in making decisions to optimize your'
? '        long haul communications network.  This program is currently'
? '        limited to telephone traffic; however, future versions may'
? '        be expanded to include data traffic as well.  The program is'
? "        menu driven so you needn't worry if you are uncomfortable"
? '        with computers or programming.  Each option, when selected,'
? '        will provide a description along with the information you'
? '        are required to provide.  If you need a different selection,'
? '        you can return to any level of the menu to make a different'
? '        selection.  Press the <Esc> key any time you wish to terminate'
? '        the OPTICOM program.'
?
?
WAIT

DO WHILE .T.
    CLEAR
    @ 5,10 SAY "MAIN MENU"
    @ 8,15 SAY "1 - DETERMINE LEAST COST WATS CARRIER FOR CURRENT NETWORK."
```

AD-A166 744 A COMPUTER PROGRAM FOR OPTIMIZING LONG HAUL TELEPHONE NETWORKS FOR LEAST..(U) AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH S A DRAPER 1986 2/3

UNCLASSIFIED AFIT/CI/NR-86-48T F/G 17/2 NL





MICROCOP CHART

```
    @ 9,15 SAY "2 - OPTIMIZE CURRENT NETWORK FOR WATS CARRIER"
    @ 10,15 SAY "3 - LOAD NEW CARRIER RATE TABLES."
    @ 11,15 SAY "4 - VIEW EXISTING RESULT FILES."
    @ 12,15 SAY "5 - DELETE EXISTING FILE."

    @ 15,15 SAY "0 - FINISHED."

    STORE " " TO CHOICE
    @ 18,15 SAY "CHOOSE ONE:"  GET CHOICE PICTURE "9"
    READ

    DO CASE
        CASE CHOICE = "0"
            CANCEL
        CASE CHOICE = "1"
            SET PATH TO B:\NOWNET
            DO NOWNET
        CASE CHOICE = "2"
            SET PATH TO B:\NEWNET
            DO NEWNET
        CASE CHOICE = "3"
            SET PATH TO B:\TABLES
            DO TABLES
        CASE CHOICE = "4"
            SET PATH TO B:\RESULTS
            DO RESULTS
        CASE CHOICE = "5"
            SET PATH TO B:\DELETE
            DO DELETE
    ENDCASE
SET PATH TO B:
ENDDO

SET ECHO OFF
```

```
TYPE \NOWNET\NOWNET.PRG


DO TEXT

CLEAR
RESTORE FROM \TABLES\CONSTANT
FLAG = .T.
DO WHILE FLAG
    STORE 80 TO METRO
    STORE 65 TO SBS1
    STORE 20 TO SBS2
    STORE 10 TO SBS3
    @ 5,10 SAY "PRESS RETURN KEY TO USE DEFAULT VALUES OR ENTER YOUR OWN."
    @ 8,10 SAY "MCI & SPRINT METROPOLITAN PERCENTAGE:" GET METRO
    @ 10,10 SAY "SBS SKYLINE TIER 1:" GET SBS1
    @ 12,10 SAY "SBS SKYLINE TIER 2:" GET SBS2
    @ 14,10 SAY "SBS SKYLINE TIER 3:" GET SBS3
    READ
    IF SBS1 + SBS2 + SBS3 <=100 .AND. METRO <= 100
        FLAG = .F.
        SBS4 = 100 - SBS1 - SBS2 - SBS3
        @ 16,10
        @ 16,10 SAY "SBS SKYLINE TIER 4:" GET SBS4
        ?
        WAIT
    ELSE
        @ 16,10 SAY "INVALID ENTRIES.  TOTALS EXCEED 100%.  REENTER VALUES."
    ENDIF
ENDDO
SET SAFETY OFF
SAVE TO \TABLES\CONSTANT
SET SAFETY ON

CLEAR
USE NOWNET
SET SAFETY OFF
ZAP
SET SAFETY ON
FINISHED = .F.
DO WHILE .NOT. FINISHED
    GOTO BOTTOM
    APPEND BLANK
    REPLACE USE_DAY WITH 0
    REPLACE USE_EVE WITH 0
    REPLACE USE_NIGHT WITH 0
```

```
@  5,10 SAY "ENTER INFORMATION FOR EACH WATS BAND YOU CURRENTLY HAVE."
VALID = .F.
@ 11,10 CLEAR

DO WHILE .NOT. VALID
   DELETE
   PACK
   APPEND BLANK
   REPLACE USE_DAY WITH 0
   REPLACE USE_EVE WITH 0
   REPLACE USE_NIGHT WITH 0
   REPLACE OUT WITH .T.
   REPLACE QUANTITY WITH 0
   @  9,10 SAY "                  WATS BAND (1 THRU 6):" GET BAND
   READ
   IF BAND  >=1 .AND. BAND <= 6
      VALID = .T.
      @ 11,10
   ELSE
      @ 11,10 SAY "INVALID ENTRY.  REENTER BAND."
   ENDIF
ENDDO

@ 11,10 SAY "             IS THIS AN OUT WATS (T/F)?" GET OUT
@ 13,10 SAY "                        NUMBER OF LINES:" GET QUANTITY
@ 15,10 SAY "AVERAGE HOURS BILLED PER LINE PER MONTH:"
@ 16,10 SAY "                                   DAY:" GET USE_DAY
@ 17,10 SAY "                               EVENING:" GET USE_EVE
@ 18,10 SAY "                         NIGHT/WEEKEND:" GET USE_NIGHT

@ 20,10 SAY "IS THIS YOUR LAST ENTRY (T/F)?" GET FINISHED
READ




   IF FINISHED
      @ 22,10 SAY "DOUBLE CHECK YOUR ENTRIES AND MAKE CORRECTIONS ON NEXT SCR
EEN."
      @ 23,10 SAY "PRESS <Ctrl><End> WHEN FINISHED."
      WAIT
      CLEAR
      GOTO TOP
      BROWSE
      GOTO TOP
      DO WHILE .NOT. EOF()
         IF BAND > 6 .OR. BAND < 1
            CLEAR
            @  12,1 SAY "INVALID ENTRIES. BAND MUST BE 1 THRU 6. PLEASE MAK
E CORRECTIONS ON NEXT SCREEN."
            @ 13,10 SAY "PRESS <Ctrl><End> WHEN FINISHED."
```

```
            WAIT
            BROWSE
            GOTO TOP
         ELSE
         SKIP
         ENDIF
      ENDDO

      PACK
   ELSE
   ENDIF

ENDDO

DO COMPUTE
RETURN

SET ECHO OFF
```

```
TYPE \NONNET\TEXT.PRG


CLEAR
@ 5,15 SAY "DETERMINE THE LEAST COST WATS CARRIER"
?
?
?
? "        This option will determine which carrier is the least"
? "    costly for your existing network.  The carriers  used are"
? "    MCI, SPRINT, SBS Skyline, and AT&T.  You must provide information"
? "    on your current configuration for each line as follows:"
?
? "              (1)  Average hours billed each month."
? "              (2)  WATS band."
? "              (3)  WATS in or out."
? "              (4)  Percentage of calls to metropolitan areas."
?

STORE "N" TO CHOICE
@ 23,15 SAY "DO YOU WISH TO CONTINUE WITH THIS OPTION (Y/N)?"           GET C
HOICE PICTURE "!"
READ

IF CHOICE <> "Y"
   RETURN
ENDIF

CLEAR
?
?
?
?
?
? "           MCI and SPRINT have two rate tables:"
? "        one for calls that utilize only their facilities, such as"
? "        large cities, and one for calls that must also utilize AT&T"
? "        facilities, such as rural areas.  The default values"
? "        for MCI and SPRINT are 80% ON-NET (metropolitan) and"
? "        20% OFF-NET (rural)."
?
?

WAIT
CLEAR
```

```
?
?
? "          SBS Skyline has all WATS band calls over a single"
? "      access channel rather than a separate line for different"
? "      bands of service.  Consequently, their rate tables take"
? "      into account where the destination of the call is"
? "      for billing purposes.  SBS rates are based on a four"
? "      tier structure as follows:"
?
? "         TIER 1 - Major metropolitan areas."
? "         TIER 2 - Includes additional frequently called cities."
? "         TIER 3 - Includes remainder of contiguous US, Puerto Rico,"
? "                  and the Virgin Islands."
? "         TIER 4 - Equivalent WATS band 1 coverage of bordering states."
?
? "          Default values for SBS Skyline are 65%/20%/10%/5% for"
? "      TIERs 1 through 4 respectively.  If your calling patterns"
? "      are unusual, then enter different values.  For example, a"
? "      stock brokerage would have close to 100% of its calls to "
? "      metropolitan areas and a farm implement company mostly to"
? "      rural areas."
?
?

WAIT
RETURN

SET ECHO OFF
```

```
TYPE \NONNET\COMPUTE.PRG


CLEAR
@ 12,10 SAY "WAIT A MINUTE WHILE I DO SOME FIGURING."
@ 13,10 SAY "COMPUTING AT&T COST."
DO COMPAT&T
@ 14,10 SAY "COMPUTING MCI COST."
DO COMPMCI
@ 15,10 SAY "COMPUTING GTE SPRINT COST."
DO COMPSPNT
USE RESULTS
COUNT TO COUNT

IF COUNT > 1
    DO SORT
ELSE
ENDIF

@ 16,10 SAY "COMPUTING SBS SKYLINE COST."
DO COMPSBS
DO STORE
DO OUTPUT
RETURN

SET ECHO OFF
```

```
TYPE \NONNET\COMPAT&T.PRG


CLEAR ALL
USE RESULTS
SET SAFETY OFF
ZAP
SET SAFETY ON
APPEND FROM NONNET
GOTO TOP
RESTORE FROM \TABLES\CONSTANT


SELECT 1
DO WHILE .NOT. EOF()
    IF OUT
        SELECT 2
        USE \TABLES\AT&TOUT
    ELSE
        SELECT 2
        USE \TABLES\AT&TIN
    ENDIF
    LOCATE FOR BAND = A->BAND
    SELECT 1
    DO CASE
        CASE USE_DAY >= 80
           REPLACE DAY_ATT WITH (B->DAY15*15 + B->DAY25*25 + B->DAY40*40 +
                           (USE_DAY-80)*B->DAY80) * QUANTITY
        CASE 40 < USE_DAY .AND. USE_DAY < 80
           REPLACE DAY_ATT WITH (B->DAY15*15 + B->DAY25*25 +
               (USE_DAY-40)*B->DAY40) * QUANTITY
        CASE 15 < USE_DAY .AND. USE_DAY <= 40
           REPLACE DAY_ATT WITH (B->DAY15*15 + (USE_DAY-15)*B->DAY25)
                       * QUANTITY
        CASE USE_DAY <= 15
           REPLACE DAY_ATT WITH USE_DAY*B->DAY15 * QUANTITY
    ENDCASE

    DO CASE
        CASE USE_EVE >= 80
            REPLACE EVE_ATT WITH (B->EVE15*15 + B->EVE25*25 +
            B->EVE40*40 + (USE_EVE-80)*B->EVE80) * QUANTITY
        CASE 40 < USE_EVE .AND. USE_EVE < 80
            REPLACE EVE_ATT WITH (B->EVE15*15 + B->EVE25*25 +
            (USE_EVE-40)*B->EVE40) * QUANTITY
        CASE 15 < USE_EVE .AND. USE_EVE <= 40
```

```
            REPLACE EVE_ATT WITH (B->EVE15*15 +                              (U
SE_EVE-15)*B->EVE25) * QUANTITY
        CASE USE_EVE <= 15
            REPLACE EVE_ATT WITH USE_EVE*B->EVE15 * QUANTITY
    ENDCASE

    REPLACE NIGHT_ATT WITH (USE_NIGHT * B->WEEKEND * QUANTITY)
    REPLACE ACCES_ATT WITH B->ACCESS * QUANTITY

    IF DAY_ATT + EVE_ATT + NIGHT_ATT >= QUANTITY*ATT_MIN
        REPLACE ATT_TOTAL WITH DAY_ATT+EVE_ATT+NIGHT_ATT+ACCES_ATT
    ELSE
        REPLACE ATT_TOTAL WITH QUANTITY*ATT_MIN + ACCES_ATT
    ENDIF

    SKIP
ENDDO
RETURN


SET ECHO OFF
```

```
TYPE \NONNET\COMPMCI.PRG


CLEAR ALL
RESTORE FROM \TABLES\CONSTANT
USE RESULTS
GOTO TOP
SELECT 1
DO WHILE .NOT. EOF()
    IF OUT
        SELECT 2
        USE \TABLES\MCIOUT
        LOCATE FOR BAND = A->BAND
        SELECT 1
        DO CASE
            CASE USE_DAY >= 80
                REPLACE DAY_MCI WITH (B->DAY15*15 + B->DAY25*25 +
         B->DAY40*40 + (USE_DAY-80)*B->DAY80) * QUANTITY                    *
METRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE DAY_MCI WITH (B->DAY15*15 + B->DAY25*25 +
       B->DAY40*40 + (USE_DAY-80)*B->DAY80) * QUANTITY                    * (1
00-METRO)/100 + DAY_MCI
            CASE 40 < USE_DAY .AND. USE_DAY < 80
                REPLACE DAY_MCI WITH (B->DAY15*15 + B->DAY25*25 +
       (USE_DAY-40)*B->DAY40) * QUANTITY * METRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE DAY_MCI WITH (B->DAY15*15 + B->DAY25*25 +
       (USE_DAY-40)*B->DAY40) * QUANTITY * (100-METRO)/100 +
  DAY_MCI
            CASE 15 < USE_DAY .AND. USE_DAY <= 40
                REPLACE DAY_MCI WITH (B->DAY15*15 + (USE_DAY-15)*B->DAY25)
                *  QUANTITY * METRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE DAY_MCI WITH (B->DAY15*15 + (USE_DAY-15)*B->DAY25)
                * QUANTITY * (100-METRO)/100 + DAY_MCI
            CASE USE_DAY <= 15
                REPLACE DAY_MCI WITH USE_DAY*B->DAY15 * QUANTITY * METRO/100
                SELECT 2
                SKIP
```

```
                SELECT 1
                REPLACE DAY_MCI WITH USE_DAY*B->DAY15 * QUANTITY
      * (100-METRO)/100 + DAY_MCI
        ENDCASE
        SELECT 2
        SKIP -1
        SELECT 1

        DO CASE
            CASE USE_EVE >= 80
                REPLACE EVE_MCI WITH (B->EVE15*15 + B->EVE25*25 +
       B->EVE40*40 + (USE_EVE-80)*B->EVE80) * QUANTITY                    * ME
TRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE EVE_MCI WITH (B->EVE15*15 + B->EVE25*25 +
       B->EVE40*40 + (USE_EVE-80)*B->EVE80) * QUANTITY *                   (
100-METRO)/100 + EVE_MCI
            CASE 40 < USE_EVE .AND. USE_EVE < 80
                REPLACE EVE_MCI WITH (B->EVE15*15 + B->EVE25*25 +
       (USE_EVE-40)*B->EVE40) * QUANTITY * METRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE EVE_MCI WITH (B->EVE15*15 + B->EVE25*25 +
       (USE_EVE-40)*B->EVE40) * QUANTITY * (100-METRO)/100 +
  EVE_MCI
            CASE 15 < USE_EVE .AND. USE_EVE <= 40
                REPLACE EVE_MCI WITH (B->EVE15*15 + (USE_EVE-15)*B->EVE25)
                * QUANTITY * METRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE EVE_MCI WITH (B->EVE15*15 + (USE_EVE-15)*B->EVE25)
                * QUANTITY * (100-METRO)/100 + EVE_MCI
            CASE USE_EVE <= 15
                REPLACE EVE_MCI WITH USE_EVE*B->EVE15 * QUANTITY * METRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE EVE_MCI WITH USE_EVE*B->EVE15 * QUANTITY
      * (100-METRO)/100 + EVE_MCI
        ENDCASE

        SELECT 2
        SKIP -1
        SELECT 1

        REPLACE NIGHT_MCI WITH (USE_NIGHT * B->WEEKEND * QUANTITY) * METRO/100
        SELECT 2
        SKIP
```

```
        SELECT 1
        REPLACE NIGHT_MCI WITH (USE_NIGHT * B->WEEKEND * QUANTITY)
* (100-METRO)/100 + NIGHT_MCI

        REPLACE ACCES_MCI WITH MCI_ACCESS * QUANTITY

        IF DAY_MCI + EVE_MCI + NIGHT_MCI >= QUANTITY*MCI_MIN
            REPLACE  MCI_TOTAL WITH DAY_MCI+EVE_MCI+NIGHT_MCI+ACCES_MCI
        ELSE
            REPLACE MCI_TOTAL WITH QUANTITY*MCI_MIN + ACCES_MCI
        ENDIF

    ELSE
    ENDIF
    SKIP
ENDDO
RETURN


SET ECHO OFF
```

```
TYPE \NONNET\COMPSPNT.PRG



CLEAR ALL
RESTORE FROM \TABLES\CONSTANT
USE RESULTS
GOTO TOP
SELECT 1
DO WHILE .NOT. EOF()
    IF OUT
        SELECT 2
        USE \TABLES\SPRNTOUT
        LOCATE FOR BAND = A->BAND
        SELECT 1
        DO CASE
            CASE USE_DAY >= 100
                REPLACE DAY_SPNT WITH (B->DAY0_40*40 + B->DAY40_70*30 +
               B->DAY70_100*30 + (USE_DAY-100)*B->DAY100PLUS) * QUANTITY
              * METRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE DAY_SPNT WITH (B->DAY0_40*40 + B->DAY40_70*30 +
             B->DAY70_100*30 + (USE_DAY-100)*B->DAY100PLUS) * QUANTITY
           * (100-METRO)/100 + DAY_SPNT
            CASE 70 < USE_DAY .AND. USE_DAY < 100
                REPLACE DAY_SPNT WITH (B->DAY0_40*40 + B->DAY40_70*30 +
             (USE_DAY-70)*B->DAY70_100) * QUANTITY * METRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE DAY_SPNT WITH (B->DAY0_40*40 + B->DAY40_70*30 +
              (USE_DAY-70)*B->DAY70_100) * QUANTITY * (100-METRO)/100 +
            DAY_SPNT
            CASE 40 < USE_DAY .AND. USE_DAY <= 70
                REPLACE DAY_SPNT WITH (B->DAY0_40*40 + (USE_DAY-40)*B->DAY40_70
)                    *  QUANTITY * METRO/100
                SELECT 2
                SKIP
                SELECT 1
                REPLACE DAY_SPNT WITH (B->DAY0_40*40 + (USE_DAY-40)*B->DAY40_70
)                    * QUANTITY * (100-METRO)/100 + DAY_SPNT
            CASE USE_DAY <= 40
                REPLACE DAY_SPNT WITH USE_DAY*B->DAY0_40 * QUANTITY * METRO/100
                SELECT 2
                SKIP
```

```
            SELECT 1
            REPLACE DAY_SPNT WITH USE_DAY*B->DAY0_40 * QUANTITY
     * (100-METRO)/100 + DAY_SPNT
    ENDCASE
    SELECT 2
    SKIP -1
    SELECT 1

    DO CASE
        CASE USE_EVE >= 100
            REPLACE EVE_SPNT WITH (B->EVE0_40*40 + B->EVE40_70*30 +
         B->EVE70_100*30 + (USE_EVE-100)*B->EVE100PLUS) * QUANTITY
       * METRO/100
            SELECT 2
            SKIP
            SELECT 1
            REPLACE EVE_SPNT WITH (B->EVE0_40*40 + B->EVE40_70*30 +
         B->EVE70_100*30 + (USE_EVE-100)*B->EVE100PLUS) * QUANTITY
       * (100-METRO)/100 + EVE_SPNT
        CASE 70 < USE_EVE .AND. USE_EVE < 100
            REPLACE EVE_SPNT WITH (B->EVE0_40*40 + B->EVE40_70*30 +
          (USE_EVE-70)*B->EVE70_100) * QUANTITY * METRO/100
            SELECT 2
            SKIP
            SELECT 1
            REPLACE EVE_SPNT WITH (B->EVE0_40*40 + B->EVE40_70*30 +
          (USE_EVE-70)*B->EVE70_100) * QUANTITY * (100-METRO)/100 +
        EVE_SPNT
        CASE 40 < USE_EVE .AND. USE_EVE <= 70
            REPLACE EVE_SPNT WITH (B->EVE0_40*40 + (USE_EVE-40)*B->EVE40_70
)                   * QUANTITY * METRO/100
            SELECT 2
            SKIP
            SELECT 1
            REPLACE EVE_SPNT WITH (B->EVE0_40*40 +                    (USE
_EVE-40)*B->EVE40_70) * QUANTITY * (100-METRO)/100                  + EVE_SP
NT
        CASE USE_EVE <= 40
            REPLACE EVE_SPNT WITH USE_EVE*B->EVE0_40 * QUANTITY * METRO/100
            SELECT 2
            SKIP
            SELECT 1
            REPLACE EVE_SPNT WITH USE_EVE*B->EVE0_40 * QUANTITY
     * (100-METRO)/100 + EVE_SPNT
    ENDCASE

    SELECT 2
    SKIP -1
    SELECT 1

    REPLACE NIGHT_SPNT WITH (USE_NIGHT * B->WEEKEND * QUANTITY) * METRO/100
    SELECT 2
```

```
        SKIP
        SELECT 1
        REPLACE NIGHT_SPNT WITH (USE_NIGHT * B->WEEKEND * QUANTITY)
 * (100-METRO)/100 + NIGHT_SPNT

        REPLACE ACCES_SPNT WITH SPNTACCESS * QUANTITY

        IF DAY_SPNT + EVE_SPNT + NIGHT_SPNT >= QUANTITY*SPRNT_MIN
            REPLACE  SPNT_TOTAL WITH DAY_SPNT+EVE_SPNT+NIGHT_SPNT+ACCES_SPNT
        ELSE
            REPLACE SPNT_TOTAL WITH QUANTITY*SPRNT_MIN + ACCES_SPNT
        ENDIF

    ELSE
    ENDIF
    SKIP
ENDDO
RETURN


SET ECHO OFF
```

```
TYPE \NOWNET\SORT.PRG


CLEAR ALL
USE RESULTS
SET SAFETY OFF
SORT ON BAND,QUANTITY TO TEMP
ZAP
APPEND FROM TEMP FOR OUT
APPEND FROM TEMP FOR .NOT. OUT
DELETE FILE TEMP.DBF
SET SAFETY ON
RETURN

SET ECHO OFF
```

```
TYPE \NONNET\COMPSBS.PRG



CLEAR ALL
SELECT 1
USE RESULTS
RESTORE FROM \TABLES\CONSTANT
SUM USE_DAY * QUANTITY TO DAYTOTAL FOR OUT
SUM (USE_EVE + USE_NIGHT) * QUANTITY TO NIGHTTOTAL FOR OUT
USETOTAL = DAYTOTAL + NIGHTTOTAL
SUM QUANTITY TO LINETOTAL FOR OUT
DAYAVG = DAYTOTAL/LINETOTAL
NIGHTAVG = NIGHTTOTAL/LINETOTAL
USEAVG = USETOTAL/LINETOTAL
SUM USE_DAY*QUANTITY TO BAND1DAY FOR OUT .AND. BAND = 1
SUM (USE_EVE+USE_NIGHT)*QUANTITY TO BAND1NIGHT FOR OUT .AND. BAND = 1
COUNT TO COUNT

IF COUNT < 4
    APPEND BLANK
    APPEND BLANK
    APPEND BLANK
    APPEND BLANK
ELSE
ENDIF


GOTO TOP
SELECT 2
USE \TABLES\SBSOUT
LOCATE FOR USAGE_HRS > USEAVG .OR. EOF()
SKIP -1
SELECT 1

REPLACE TIER WITH 1
REPLACE PERCENT WITH SBS1
REPLACE SBSHRS_DAY WITH SBS1*DAYTOTAL/100
REPLACE SBSHRS_EVE WITH SBS1 *NIGHTTOTAL/100
REPLACE DAY_SBS WITH SBS1*B->TIER1_DAY * 0.6 * DAYTOTAL/100
REPLACE NIGHT_SBS WITH SBS1*B->TIER1_OTHR * 0.6 * NIGHTTOTAL/100
REPLACE ACCES_SBS WITH SBS_ACCESS*LINETOTAL
REPLACE SBS_LINES WITH LINETOTAL
SKIP

REPLACE TIER WITH 2
REPLACE PERCENT WITH SBS2
```

```
REPLACE SBSHRS_DAY WITH SBS2*DAYTOTAL/100
REPLACE SBSHRS_EVE WITH SBS2*NIGHTTOTAL/100
REPLACE DAY_SBS WITH SBS2 * B->TIER2_DAY * 0.6 * DAYTOTAL/100
REPLACE NIGHT_SBS WITH SBS2 * B->TIER2_OTHR * 0.6 * NIGHTTOTAL/100
REPLACE SBS_LINES WITH LINETOTAL
SKIP

REPLACE TIER WITH 3
REPLACE PERCENT WITH SBS3
REPLACE SBSHRS_DAY WITH SBS3*DAYTOTAL/100
REPLACE SBSHRS_EVE WITH SBS3*NIGHTTOTAL/100
REPLACE DAY_SBS WITH SBS3 * B->TIER3_DAY * 0.6 * DAYTOTAL/100
REPLACE NIGHT_SBS WITH SBS3 * B->TIER3_OTHR * 0.6 * NIGHTTOTAL/100
REPLACE SBS_LINES WITH LINETOTAL
SKIP

REPLACE TIER WITH 4
REPLACE PERCENT WITH SBS4
REPLACE SBSHRS_DAY WITH SBS4*DAYTOTAL/100
REPLACE SBSHRS_EVE WITH SBS4 *NIGHTTOTAL/100
REPLACE DAY_SBS WITH SBS4 * B->TIER4_DAY * 0.6 * DAYTOTAL/100
REPLACE NIGHT_SBS WITH SBS4 * B->TIER4_OTHR * 0.6 * NIGHTTOTAL/100
REPLACE SBS_LINES WITH LINETOTAL

SUM DAY_SBS TO SUMDAY
SUM NIGHT_SBS TO SUMNIGHT
GOTO TOP

IF USEAVG < SBS_HRSMIN .AND. SUMDAY + SUMNIGHT < SBS_MIN*LINETOTAL
    REPLACE SBS_TOTAL WITH SBS_MIN*LINETOTAL + ACCES_SBS
ELSE
    REPLACE SBS_TOTAL WITH SUMDAY + SUMNIGHT + ACCES_SBS
ENDIF

RETURN

SET ECHO OFF
```

```
TYPE \NOWNET\OUTPUT.PRG



CLEAR ALL
DO WHILE .T.
    CLEAR
    STORE " " TO CHOICE
    @  8,25 SAY "-1- DISPLAY RESULTS ON SCREEN."
    @ 10,25 SAY "-2- PRINT OUT THE RESULTS."
    @ 13,25 SAY "-0- FINISHED."
    @ 17,25 SAY "CHOOSE ONE:"  GET CHOICE PICTURE "9"
    READ

    DO CASE
        CASE CHOICE = "1"
            DO DISPLAY
        CASE CHOICE = "2"
            DO PRINT
        CASE CHOICE = "0"
            DO FINISH
            RETURN
    ENDCASE

ENDDO

SET ECHO OFF
```

```
TYPE \NOWNET\DISPLAY.PRG


CLEAR
TEXT


                    CURRENT CONFIGURATION


      A report summary will be displayed for each carrier plus
      a comparison report of all the carriers.  The display
      will wait between reports.  Press <Ctrl><S> to stop the
      scrolling.  Press <Ctrl><S> again to resume.


ENDTEXT
WAIT
CLEAR
USE RESULTS
IF OUT
   RESTORE FROM \TABLES\CONSTANT
   SUM QUANTITY TO NUMLINES FOR OUT
   SELECT 2
   USE \TABLES\AT&TOUT

   IF NUMLINES = 0
      CONECTOTAL = 0
   ELSE
      CONECTOTAL = CONNECT1 + (NUMLINES-1)*CONNECT2
   ENDIF
   SELECT 1
   LINE1 = "     Access charge is $" + STR(B->ACCESS,6,2) + " per line."
   LINE2 = "     Connection charge is $" + STR(B->CONNECT1,6,2) + " for the fi
rst line and "
   LINE3 = "     $" + STR(B->CONNECT2,6,2) + " for each successive line."
   LINE4 = "     Total connection charge for this configuration is $" + STR(CO
NECTOTAL,7,2) + "."
   LINE5 = "     Minimum usage charge is $" + STR(ATT_MIN,6,2) + " per line ex
clusive of access charges."


   REPORT FORM AT&TOUT FOR OUT
```

```
    WAIT
    ?
    ?
    ?
    ? LINE1
    ? LINE2
    ? LINE3
    ? LINE4

    IF ATT_MIN > 0
       ? LINE5
    ELSE
    ENDIF
    WAIT

    CLEAR


    IF NUMLINES = 0
       CONECTOTAL = 0
    ELSE
       CONECTOTAL = MCICONNECT * NUMLINES
    ENDIF


    LINE1 = "     Access charge is $" + STR(MCI_ACCESS,6,2) + " per line."
    LINE2 = "     Connection charge is $" + STR(MCICONNECT,6,2) + " per line."
    LINE3 = "     Total connection charge for this configuration is $" + STR(CO
NECTOTAL,7,2) + "."
    LINE4 = "     Minimum usage charge is $" + STR(MCI_MIN,6,2) + " per line ex
clusive of access charges."

    REPORT FORM MCIOUT FOR OUT HEADING STR(METRO,3,0) + "% ON-NET/" + STR(100-M
ETRO,3,0) + "% OFF-NET"
    WAIT
    ?
    ?
    ?
    ? LINE1
    ? LINE2
    ? LINE3

    IF MCI_MIN > 0
       ? LINE4
    ELSE
    ENDIF
    WAIT

    CLEAR


    IF NUMLINES = 0
```

```
      CONECTOTAL = 0
   ELSE
      CONECTOTAL = SPNTCONECT * NUMLINES
   ENDIF


   LINE1 = "     Access charge is $" + STR(SPNTACCESS,6,2) + " per line."
   LINE2 = "     Connection charge is $" + STR(SPNTCONECT,6,2) + " per line."
   LINE3 = "     Total connection charge for this configuration is $" + STR(CO
NECTOTAL,7,2) + "."
   LINE4 = "     Minimum usage charge is $" + STR(SPRNT_MIN,6,2) +  "per line
exclusive of access charges."

   REPORT FORM SPRNTOUT FOR OUT HEADING STR(METRO,3,0) + "% ON-NET/"        +
 STR(100-METRO,3,0) + "% OFF-NET"
   WAIT
   ?
   ?
   ?
   ? LINE1
   ? LINE2
   ? LINE3

   IF SPRNT_MIN > 0
      ? LINE4
   ELSE
   ENDIF
   WAIT

   CLEAR

   GOTO TOP
   LINE1 = "     Access charge is $" + STR(SBS_ACCESS,6,2) + " per line."
   LINE2 = "     Total monthly access charge for this configuration is $" + ST
R(ACCES_SBS,7,2) + "."
   LINE3 = "     Minimum usage charge is $" + STR(SBS_MIN,6,2) +          "if
average use is less than " + STR(SBS_HRSMIN,3,0) + " hours/line."
   LINE4 = "     Total monthly cost for this configuration is $" +        STR
(SBS_TOTAL,11,2) + "."
   LINE5 = "     Connection charges per line are based on the distance between
 your"
   LINE6 = "     exchange carrier wire center and the SBS Skyline WATS access
point."
   REPORT FORM SBSOUT FOR TIER >= 1 .AND. TIER <= 4
   WAIT
   ?
   ?
   ?
   ? LINE1
   ? LINE2
   IF SBS_MIN > 0
      ? LINE3
```

```
    ELSE
    ENDIF

    ? LINE4
    ? LINE5
    ? LINE6
    USE \TABLES\SBSCONEC
    SET MARGIN TO 30
    ?
    ?
    ?
    DISPLAY OFF ALL
    ?
    SET MARGIN TO 0
    WAIT

    CLEAR

    USE RESULTS
    LINE1 = "     SBS Skyline total monthly cost is $" + STR(SBS_TOTAL,11,2) +
"."
    REPORT FORM COMPARE FOR OUT
    ?
    ? LINE1
    WAIT
ENDIF

LOCATE FOR .NOT. OUT

IF BAND > 0
    CLEAR
    RESTORE FROM \TABLES\CONSTANT
    SUM QUANTITY TO NUMLINES FOR .NOT. OUT
    SELECT 2
    USE \TABLES\AT&TIN

    IF NUMLINES = 0
        CONECTOTAL = 0
    ELSE
        CONECTOTAL = CONNECT1 + (NUMLINES) *CONNECT2
    ENDIF


    SELECT 1
    LINE1 = "     Access charge is $" + STR(B->ACCESS,6,2) + " per line."
    LINE2 = "     Connection charge is $" + STR(B->CONNECT1,6,2) + " for the fi
rst line and "
    LINE3 = "     $" + STR(B->CONNECT2,6,2) + " for each successive line."
    LINE4 = "     Total connection charge for this configuration is $"  + STR(C
ONECTOTAL,7,2) + "."
    LINE5 = "     Minimum usage charge is $" + STR(ATT_MININ,6,2) + " per line
exclusive of access charges."
```

```
    REPORT FORM AT&TIN FOR .NOT. OUT .AND. ATT_TOTAL > 0
    WAIT
    ?
    ?
    ?
    ? LINE1
    ? LINE2
    ? LINE3
    ? LINE4

    IF ATT_MININ > 0
       ? LINE5
    ELSE
    ENDIF

    WAIT
    CLEAR
ENDIF

RETURN


SET ECHO OFF
```

```
TYPE \NOWNET\PRINT.PRG



CLEAR
@ 0,10 SAY "ALIGN PAPER AND TURN ON PRINTER"
WAIT
USE RESULTS

IF OUT
    RESTORE FROM \TABLES\CONSTANT
    SUM QUANTITY TO NUMLINES FOR OUT
    SELECT 2
    USE \TABLES\AT&TOUT

    IF NUMLINES = 0
        CONECTOTAL = 0
    ELSE
        CONECTOTAL = CONNECT1 + (NUMLINES-1)*CONNECT2
    ENDIF

    SELECT 1
    LINE1 = "     Access charge is $" + STR(B->ACCESS,6,2) + " per line."
    LINE2 = "     Connection charge is $" + STR(B->CONNECT1,6,2) + " for the fi
rst line and "
    LINE3 = "     $" + STR(B->CONNECT2,6,2) + " for each successive line."
    LINE4 = "     Total connection charge for this configuration is $" + STR(CO
NECTOTAL,7,2) + "."
    LINE5 = "     Minimum usage charge is $" + STR(ATT_MIN,6,2) + " per line ex
clusive of access charges."



    REPORT FORM AT&TOUT FOR OUT NOEJECT TO PRINT
    SET PRINT ON
    ?
    ?
    ?
    ? LINE1
    ?
    ? LINE2
    ? LINE3
    ?
    ? LINE4
    ?

    IF ATT_MIN > 0
```

```
        ? LINE5
        ?
    ELSE
    ENDIF

    SET PRINT OFF
    CLEAR


    IF NUMLINES = 0
        CONECTOTAL = 0
    ELSE
        CONECTOTAL = MCICONNECT * NUMLINES
    ENDIF


    LINE1 = "     Access charge is $" + STR(MCI_ACCESS,6,2) + " per line."
    LINE2 = "     Connection charge is $" + STR(MCICONNECT,6,2) + " per line."
    LINE3 = "     Total connection charge for this configuration is $" + STR(CO
NECTOTAL,7,2) + "."
    LINE4 = "     Minimum usage charge is $" + STR(MCI_MIN,6,2) + " per line ex
clusive of access charges."

    REPORT FORM MCIOUT FOR OUT HEADING STR(METRO,3,0) + "% ON-NET/" +        S
TR(100-METRO,3,0) + "% OFF-NET" TO PRINT
    SET PRINT ON
    ?
    ?
    ?
    ? LINE1
    ?
    ? LINE2
    ?
    ? LINE3
    ?

    IF MCI_MIN > 0
        ? LINE4
        ?
    ELSE
    ENDIF

    SET PRINT OFF
    CLEAR


    IF NUMLINES = 0
        CONECTOTAL = 0
    ELSE
        CONECTOTAL = SPNTCONECT * NUMLINES
    ENDIF
```

```
    LINE1 = "     Access charge is $" + STR(SPNTACCESS,6,2) + " per line."
    LINE2 = "     Connection charge is $" + STR(SPNTCONECT,6,2) + " per line."
    LINE3 = "     Total connection charge for this configuration is $" + STR(CO
NECTOTAL,7,2) + "."
    LINE4 = "     Minimum usage charge is $" + STR(SPRNT_MIN,6,2) + " per line
exclusive of access charges."
    REPORT FORM SPRNTOUT FOR OUT HEADING STR(METRO,3,0) + "% ON-NET/" + STR(100
-METRO,3,0) + "% OFF-NET" TO PRINT
    SET PRINT ON
    ?
    ?
    ?
    ? LINE1
    ?
    ? LINE2
    ?
    ? LINE3
    ?

    IF SPRNT_MIN > 0
       ? LINE4
       ?
    ELSE
    ENDIF
    SET PRINT OFF
    CLEAR
    GOTO TOP
    LINE1 = "     Access charge is $" + STR(SBS_ACCESS,6,2) + " per line."
    LINE2 = "     Total monthly access charge for this configuration is $" + ST
R(ACCES_SBS,7,2) + "."
    LINE3 = "     Minimum usage charge is $" + STR(SBS_MIN,6,2) + " if average
use is less than " + STR(SBS_HRSMIN,3,0) + " hours/line."
    LINE4 = "     Total monthly cost for this configuration is $" + STR(SBS_TOT
AL,11,2) + "."
    LINE5 = "     Connection charges per line are based on the distance between
 your"
    LINE6 = "     exchange carrier wire center and the SBS Skyline WATS access
point."
    REPORT FORM SBSOUT FOR TIER >= 1 .AND. TIER <= 4 TO PRINT
    SET PRINT ON
    ?
    ?
    ?
    ? LINE1
    ? LINE2
    ?
    IF SBS_MIN > 0
       ? LINE3
    ELSE
    ENDIF
    ? LINE4
```

```
    ?
    ? LINE5
    ? LINE6
    USE \TABLES\SBSCONEC
    SET MARGIN TO 30
    ?
    ?
    ?
    DISPLAY OFF ALL
    ?
    SET MARGIN TO 0
    SET PRINT OFF
    CLEAR
    USE RESULTS
    LINE1 = "     SBS Skyline total monthly cost is $" + STR(SBS_TOTAL,11,2) +
"."
    REPORT FORM COMPARE FOR OUT TO PRINT
    SET PRINT ON
    ?
    ? LINE1
    ?
    SET PRINT OFF
ENDIF

LOCATE FOR .NOT. OUT

IF BAND > 0
    CLEAR
    RESTORE FROM \TABLES\CONSTANT
    SUM QUANTITY TO NUMLINES FOR .NOT. OUT
    SELECT 2
    USE \TABLES\AT&TIN

    IF NUMLINES = 0
        CONECTOTAL = 0
    ELSE
        CONECTOTAL = CONNECT1 + (NUMLINES) *CONNECT2
    ENDIF


    SELECT 1
    LINE1 = "     Access charge is $" + STR(B->ACCESS,6,2) + " per line."
    LINE2 = "     Connection charge is $" + STR(B->CONNECT1,6,2) + " for the fi
rst line and "
    LINE3 = "     $" + STR(B->CONNECT2,6,2) + " for each successive line."
    LINE4 = "     Total connection charge for this configuration is $"  + STR(C
ONECTOTAL,7,2) + "."
    LINE5 = "     Minimum usage charge is $" + STR(ATT_MININ,6,2) + " per line
exclusive of access charges."


    REPORT FORM AT&TIN FOR .NOT. OUT .AND. ATT_TOTAL > 0 TO PRINT
```

```
    SET PRINT ON
    ?
    ?
    ?
    ? LINE1
    ?
    ? LINE2
    ? LINE3
    ?
    ? LINE4
    ?
    IF ATT_MININ > 0
       ? LINE5
       ?
    ELSE
    ENDIF
    SET PRINT OFF
ENDIF

CLEAR
RETURN

SET ECHO OFF
```

```
TYPE \NONNET\FINISH.PRG



CLEAR ALL
RESTORE FROM \TABLES\CONSTANT
RELEASE ALL EXCEPT METRO
CLEAR
DO WHILE .T.
    STORE "Y" TO CHOICE
    @ 20,10 SAY "DO YOU WISH TO SAVE THESE RESULTS FOR LATER USE        (Y/N)?
" GET CHOICE PICTURE "!"
    READ

    DO CASE
        CASE CHOICE = "N"
            RETURN
        CASE CHOICE = "Y"
            CLEAR
            STORE "           " TO FILENAME
            TEXT
   Filenames can have up to eight letters and/or numbers, must begin with a
letter, and can have no imbedded blanks. (XXXXXXXX.DBF).

    EXISTING FILENAMES ARE:
            ENDTEXT
            DIR \RESULTS\*.DBF

            @ 23,10 SAY "ENTER FILENAME WHERE RESULTS ARE TO BE STORED:"
           GET FILENAME PICTURE "!!!!!!!!"
            READ
            FILENAME = TRIM(FILENAME)
            OPTIMIZE = .F.
            RELEASE CHOICE
            CONSTANT = FILENAME + ".MEM"
            SAVE TO \RESULTS\&CONSTANT
            FILENAME = FILENAME + ".DBF"
            SET TALK ON
            COPY FILE RESULTS.DBF TO \RESULTS\&FILENAME
            SET TALK OFF
            RETURN
    ENDCASE

ENDDO

SET ECHO OFF
```

```
TYPE \NEWNET\NEWNET.PRG


CLEAR ALL
CLEAR
TEXT
                        OPTIMIZE CURRENT NETWORK

       This option will determine the number of trunks you need for
       each band in your network optimized for least cost for each
       carrier.  Information is utilized from the present network
       which was entered in option <1> DETERMINE LEAST COST WATS
       CARRIER.  To optimize your network requires a call recording
       device on each of your WATS lines to determine your actual
       calling patterns.  You must provide the busy hour traffic
       for each WATS band.

       Also, you must provide the "P" value required for your lines.
       A value of "P10" means that during the busy hour, 10 percent
       of the calls attempted will receive a busy signal on the first
       attempt.  The lower the "P" value, the better the availability
       of lines; however, it requires more trunks at a higher expense.
       The default value is the highest "P" value of your present
       network.
ENDTEXT

SET SAFETY OFF

STORE "N" TO CHOICE
@ 23,15 SAY "DO YOU WISH TO CONTINUE WITH THIS OPTION (Y/N)?"        GET CHOIC
E PICTURE "!"
READ

IF CHOICE <> "Y"
    RETURN
ENDIF

CLEAR
@ 5,10 SAY "EXISTING RESULT FILES ARE:"
?
?
DIR \RESULTS\*.DBF
?
?
STORE "        " TO FILENAME
@ 24,50 SAY "CHOOSE ONE:" GET FILENAME PICTURE "!!!!!!!!"
```

```
READ

IF FILENAME = '        '
    RETURN
ENDIF


?
FILENAME = TRIM(FILENAME)

FILE = FILENAME + ".DBF"
USE NEWNET
ZAP
USE \RESULTS\&FILE
COPY TO \NEWNET\NEWNET FIELDS BAND, OUT, QUANTITY, USE_DAY, USE_EVE, USE_NIGHT

CLEAR
SAVE TO \NEWNET\TEMP
GOTO TOP

IF OUT
    DO OUTWATS
ENDIF

CLEAR ALL
CLEAR
RESTORE FROM TEMP
USE \RESULTS\&FILE

LOCATE FOR .NOT. OUT .AND. BAND > 0

IF .NOT. EOF()
    DO INWATS
ENDIF

DO OUTPUT

RETURN


SET ECHO OFF
```

```
TYPE \NEWNET\OUTMATS.PRG



RESTORE FROM TEMP
USE NEWNET
LOCATE FOR .NOT. OUT .OR. EOF()
SKIP -1
MAX = BAND
ROW = 5
PEAKHR1 = 0.0
PEAKHR2 = 0.0
PEAKHR3 = 0.0
PEAKHR4 = 0.0
PEAKHR5 = 0.0
PEAKHR6 = 0.0
NUMBER  = 1
CLEAR
@ 2,5 SAY "ENTER TOTAL PEAK HOUR OUT MATS TRAFFIC IN MINUTES FOR EACH BAND:"

DO WHILE NUMBER <= MAX
    TEMP = "PEAKHR" + STR(NUMBER,1,0)
    @ ROW,10 SAY "BAND" + STR(NUMBER,1,0) + ":  " GET &TEMP PICTURE "999.9"
    NUMBER = NUMBER + 1
    ROW = ROW + 2

ENDDO

READ

USE NEWNET
ROW = 4
HIGH_P = 0
TEMP = 0
PEAKNUM = 1
LOCATE FOR BAND > TEMP


DO WHILE OUT .AND. .NOT. EOF()
    TEMP = BAND
    PEAKTOTAL = 0

    DO WHILE PEAKNUM <= TEMP
        NAMEPK = "PEAKHR" + STR(PEAKNUM,1,0)
        PEAKTOTAL = PEAKTOTAL + &NAMEPK
        PEAKNUM = PEAKNUM + 1
    ENDDO
```

```
    SUM  QUANTITY TO LINES FOR BAND = TEMP .AND. OUT
    SELECT 2
    USE POISSON
    LOCATE FOR TRUNKS = LINES
    NUMBER = 1
    FLAG = .T.

    DO WHILE NUMBER <= 50 .AND. FLAG
        IF NUMBER > 9
            FIELD = "P" + STR(NUMBER,2,0)
        ELSE
            FIELD = "P" + STR(NUMBER,1,0)
        ENDIF

        IF &FIELD >= PEAKTOTAL
            FLAG = .F.
        ENDIF

        NUMBER = NUMBER + 1
    ENDDO
    @ ROW,40 SAY "BAND" + STR(TEMP,1,0) + " TRUNKS:  " GET FIELD

    IF NUMBER -1 >  HIGH_P
        HIGH_P = NUMBER -1
    ENDIF

    ROW = ROW + 2
    SELECT 1
    LOCATE FOR BAND > TEMP
ENDDO

CLEAR GETS

FLAG = .T.
DO WHILE FLAG
    TEMP2 = HIGH_P
    @ 20,5 SAY 'PRESS RETURN KEY TO USE DEFAULT "P" VALUE OR ENTER YOUR OWN:  '
        GET HIGH_P PICTURE "99"
    READ
    IF HIGH_P <= 50 .AND. HIGH_P >= 1
        FLAG = .F.
    ELSE
        HIGH_P = TEMP2
        @ 22,5 SAY '"P" VALUE MUST BE 1 THRU 50.  REENTER VALUE.'
    ENDIF
ENDDO

WAIT
```

```
USE NEWNET
ZAP
NUMBER = 1

DO WHILE NUMBER <= MAX
    APPEND BLANK
    REPLACE BAND WITH NUMBER
    REPLACE OUT WITH .T.
    NUMBER = NUMBER + 1
ENDDO

CLEAR
GOTO TOP
@ 5,10 SAY "ENTER ACTUAL MEASURED TRAFFIC IN HOURS PER MONTH:"

DO WHILE .NOT. EOF()
    @ 11,10 SAY "BAND" + STR(BAND,1,0)
    @ 13,10 SAY "          DAY:"  GET USE_DAY
    @ 15,10 SAY "      EVENING:"  GET USE_EVE
    @ 17,10 SAY "NIGHT/WEEKEND:"  GET USE_NIGHT
    READ
    SKIP
ENDDO

WAIT
SAVE TO \NEWNET\TEMP
DO OUTCPUTE
RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\OUTCPUTE.PRG


RESTORE FROM TEMP
CLEAR
USE POSSIBLE

DO CASE
    CASE MAX = 1
        LOCATE FOR ONE .AND. .NOT. TWO .AND. .NOT. THREE .AND.            .NOT
. FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'TAKE A 5 MINUTE BREAK WHILE I DO SOME WORK.'
    CASE MAX = 2
        LOCATE FOR TWO .AND. .NOT. THREE .AND. .NOT. FOUR .AND.            .NO
T. FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'TAKE A 5 MINUTE BREAK WHILE I DO SOME WORK.'
    CASE MAX = 3
        LOCATE FOR THREE .AND. .NOT. FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'TAKE A 10 MINUTE BREAK WHILE I DO SOME WORK.'
    CASE MAX = 4
        LOCATE FOR FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'TAKE A 15 MINUTE BREAK WHILE I DO SOME WORK.'
    CASE MAX = 5
        LOCATE FOR FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'COME BACK IN 30 MINUTES.'
    CASE MAX = 6
        LOCATE FOR SIX
        @ 23,5 SAY 'COME BACK IN 1 HOUR.'
ENDCASE

SELECT 2
USE \RESULTS\&FILE
STORE 9999999999 TO ATTLOWCOS, MCILOWCOS


SELECT 3
USE RESULTS

SELECT 1
LASTCOUNT = 0

DO WHILE .NOT. EOF()
    DO CASE
        CASE MAX = 1
            LOCATE FOR ONE .AND. .NOT. TWO .AND. .NOT. THREE .AND.
     .NOT. FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
```

```
        CASE MAX = 2
            LOCATE FOR TWO .AND. .NOT. THREE .AND. .NOT. FOUR .AND.
      .NOT. FIVE .AND. .NOT. SIX
        CASE MAX = 3
            LOCATE FOR THREE .AND. .NOT. FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
        CASE MAX = 4
            LOCATE FOR FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
        CASE MAX = 5
            LOCATE FOR FIVE .AND. .NOT. SIX
        CASE MAX = 6
            LOCATE FOR SIX
    ENDCASE

    COUNTER = 0
    DO WHILE COUNTER < LASTCOUNT .AND. .NOT. EOF()
        CONTINUE
        COUNTER = COUNTER + 1
    ENDDO

    LASTCOUNT = LASTCOUNT + 1

    @ 23,5 SAY "CALCULATING AT&T AND MCI COST FOR CONFIGURATION "        + STR
(LASTCOUNT,2,0) + "."

    IF .NOT. EOF()
        SELECT 3
        ZAP

        IF A->ONE
            APPEND BLANK
            REPLACE BAND WITH 1
        ENDIF

        IF A->TWO
            APPEND BLANK
            REPLACE BAND WITH 2
        ENDIF

        IF A->THREE
            APPEND BLANK
            REPLACE BAND WITH 3
        ENDIF

        IF A->FOUR
            APPEND BLANK
            REPLACE BAND WITH 4
        ENDIF

        IF A->FIVE
            APPEND BLANK
            REPLACE BAND WITH 5
        ENDIF
```

```
        IF A->SIX
           APPEND BLANK
           REPLACE BAND WITH 6
        ENDIF
        SAVE TO \NEWNET\TEMP

        DO OUTLINES

        SELECT 3
        DO AT&TOUT
        DO MCIOUT
        RESTORE FROM TEMP ADDITIVE
        SELECT 1
     ENDIF
ENDDO

@ 23,5 SAY "CALCULATING COST FOR SBS SKYLINE."
DO SKYLINE
@ 23,5 SAY "CALCULATING COST FOR GTE SPRINT."
DO SPRNTOUT
@ 23,5 CLEAR
@ 23,5 SAY "STORING THE RESULTS."
DO OUTSTORE
RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\OUTLINES.PRG



RESTORE FROM TEMP
LASTBAND = 0
SELECT 4
USE NEWNET
SUM USE_DAY + USE_EVE + USE_NIGHT TO SUMEASURED
GOTO TOP
SELECT 2
SUM (USE_DAY + USE_EVE + USE_NIGHT) * QUANTITY TO SUMBILLED FOR OUT
FACTOR = SUMBILLED/SUMEASURED


SELECT 3
GOTO TOP

DO WHILE .NOT. EOF()
    NUMBER = LASTBAND + 1
    STORE 0 TO PEAKSUM, DAYSUM, EVESUM, NIGHTSUM

    DO WHILE NUMBER <= BAND
        NAME = "PEAKHR" + STR(NUMBER,1,0)
        PEAKSUM = PEAKSUM + &NAME
        NUMBER = NUMBER + 1
    ENDDO

    SELECT 4
    DO WHILE BAND <= C->BAND .AND. .NOT. EOF()
        DAYSUM = DAYSUM + USE_DAY
        EVESUM = EVESUM + USE_EVE
        NIGHTSUM = NIGHTSUM + USE_NIGHT
        SKIP
    ENDDO


    SELECT 5
    USE POISSON

    IF HIGH_P <= 9
        P = "P" + STR(HIGH_P,1,0)
    ELSE
        P = "P" + STR(HIGH_P,2,0)
    ENDIF
```

```
    LOCATE FOR &P >= PEAKSUM
    SELECT 3
    REPLACE QUANTITY WITH E->TRUNKS
    REPLACE USE_DAY WITH DAYSUM/QUANTITY * FACTOR
    REPLACE USE_EVE WITH EVESUM/QUANTITY * FACTOR
    REPLACE USE_NIGHT WITH NIGHTSUM/QUANTITY * FACTOR
    LASTBAND = BAND
    SKIP
ENDDO

SAVE TO \NEWNET\TEMP

RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\AT&TOUT.PRG



RESTORE FROM TEMP
RESTORE FROM \TABLES\CONSTANT ADDITIVE

SELECT 6
USE \TABLES\AT&TOUT


SELECT 3
GOTO TOP
DO WHILE .NOT. EOF()
    SELECT 6
    LOCATE FOR BAND = C->BAND
    SELECT 3
    DO CASE
        CASE USE_DAY >= 80
           REPLACE DAY_ATT WITH (F->DAY15*15 + F->DAY25*25 + F->DAY40*40 +
                          (USE_DAY-80)*F->DAY80) * QUANTITY
        CASE 40 < USE_DAY .AND. USE_DAY < 80
           REPLACE DAY_ATT WITH (F->DAY15*15 + F->DAY25*25 +
               (USE_DAY-40)*F->DAY40) * QUANTITY
        CASE 15 < USE_DAY .AND. USE_DAY <= 40
           REPLACE DAY_ATT WITH (F->DAY15*15 + (USE_DAY-15)*F->DAY25)
                       *  QUANTITY
        CASE USE_DAY <= 15
           REPLACE DAY_ATT WITH USE_DAY*F->DAY15 * QUANTITY
    ENDCASE

    DO CASE
        CASE USE_EVE >= 80
            REPLACE EVE_ATT WITH (F->EVE15*15 + F->EVE25*25 +
            F->EVE40*40 + (USE_EVE-80)*F->EVE80) * QUANTITY
        CASE 40 < USE_EVE .AND. USE_EVE < 80
            REPLACE EVE_ATT WITH (F->EVE15*15 + F->EVE25*25 +
            (USE_EVE-40)*F->EVE40) * QUANTITY
        CASE 15 < USE_EVE .AND. USE_EVE <= 40
            REPLACE EVE_ATT WITH (F->EVE15*15 +                                (U
SE_EVE-15)*F->EVE25) * QUANTITY
        CASE USE_EVE <= 15
            REPLACE EVE_ATT WITH USE_EVE*F->EVE15 * QUANTITY
    ENDCASE

    REPLACE NIGHT_ATT WITH (USE_NIGHT * F->WEEKEND * QUANTITY)
    REPLACE ACCES_ATT WITH F->ACCESS * QUANTITY
```

```
    IF DAY_ATT + EVE_ATT + NIGHT_ATT >= QUANTITY*ATT_MIN
        REPLACE ATT_TOTAL WITH DAY_ATT+EVE_ATT+NIGHT_ATT+ACCES_ATT
    ELSE
        REPLACE ATT_TOTAL WITH QUANTITY*ATT_MIN + ACCES_ATT
    ENDIF

    SKIP
ENDDO

SUM ATT_TOTAL TO ATT_TOTE

IF ATT_TOTE < ATTLOWCOS
    ATTLOWCOS = ATT_TOTE
    SELECT 3
    USE
    SELECT 6
    USE AT&TOUT
    ZAP
    APPEND FROM \NEWNET\RESULTS
    SELECT 3
    USE RESULTS
ENDIF
SAVE ALL EXCEPT METRO TO \NEWNET\TEMP
RETURN


SET ECHO OFF
```

```
TYPE \NEWNET\MCIOUT.PRG



RESTORE FROM TEMP
RESTORE FROM \RESULTS\&FILENAME ADDITIVE
SELECT 3
GOTO TOP
DO WHILE .NOT. EOF()
        SELECT 6
        USE \TABLES\MCIOUT
        LOCATE FOR BAND = C->BAND
        SELECT 3
        DO CASE
            CASE USE_DAY >= 80
                REPLACE DAY_MCI WITH (F->DAY15*15 + F->DAY25*25 +
         F->DAY40*40 + (USE_DAY-80)*F->DAY80) * QUANTITY                    *
METRO/100
                SELECT 6
                SKIP
                SELECT 3
                REPLACE DAY_MCI WITH (F->DAY15*15 + F->DAY25*25 +
       F->DAY40*40 + (USE_DAY-80)*F->DAY80) * QUANTITY                    * (1
00-METRO)/100 + DAY_MCI
            CASE 40 < USE_DAY .AND. USE_DAY < 80
                REPLACE DAY_MCI WITH (F->DAY15*15 + F->DAY25*25 +
       (USE_DAY-40)*F->DAY40) * QUANTITY * METRO/100
                SELECT 6
                SKIP
                SELECT 3
                REPLACE DAY_MCI WITH (F->DAY15*15 + F->DAY25*25 +
       (USE_DAY-40)*F->DAY40) * QUANTITY * (100-METRO)/100 +
  DAY_MCI
            CASE 15 < USE_DAY .AND. USE_DAY <= 40
                REPLACE DAY_MCI WITH (F->DAY15*15 +                    (USE_DA
Y-15)*F->DAY25)                    *  QUANTITY * METRO/100
                SELECT 6
                SKIP
                SELECT 3
                REPLACE DAY_MCI WITH (F->DAY15*15 +                    (USE_DA
Y-15)*F->DAY25)                    * QUANTITY * (100-METRO)/100 + DAY_MCI
            CASE USE_DAY <= 15
                REPLACE DAY_MCI WITH USE_DAY*F->DAY15 * QUANTITY * METRO/100
                SELECT 6
                SKIP
                SELECT 3
                REPLACE DAY_MCI WITH USE_DAY*F->DAY15 * QUANTITY
```

```
     * (100-METRO)/100 + DAY_MCI
       ENDCASE
       SELECT 6
       SKIP -1
       SELECT 3

       DO CASE
          CASE USE_EVE >= 80
             REPLACE EVE_MCI WITH (F->EVE15*15 + F->EVE25*25 +
      F->EVE40*40 + (USE_EVE-80)*F->EVE80) * QUANTITY                    * ME
TRO/100
             SELECT 6
             SKIP
             SELECT 3
             REPLACE EVE_MCI WITH (F->EVE15*15 + F->EVE25*25 +
      F->EVE40*40 + (USE_EVE-80)*F->EVE80) * QUANTITY *                   (
100-METRO)/100 + EVE_MCI
          CASE 40 < USE_EVE .AND. USE_EVE < 80
             REPLACE EVE_MCI WITH (F->EVE15*15 + F->EVE25*25 +
      (USE_EVE-40)*F->EVE40) * QUANTITY * METRO/100
             SELECT 6
             SKIP
             SELECT 3
             REPLACE EVE_MCI WITH (F->EVE15*15 + F->EVE25*25 +
      (USE_EVE-40)*F->EVE40) * QUANTITY * (100-METRO)/100 +
  EVE_MCI
          CASE 15 < USE_EVE .AND. USE_EVE <= 40
             REPLACE EVE_MCI WITH (F->EVE15*15 + (USE_EVE-15)*F->EVE25)
             * QUANTITY * METRO/100
             SELECT 6
             SKIP
             SELECT 3
             REPLACE EVE_MCI WITH (F->EVE15*15 + (USE_EVE-15)*F->EVE25)
             * QUANTITY * (100-METRO)/100 + EVE_MCI
          CASE USE_EVE <= 15
             REPLACE EVE_MCI WITH USE_EVE*F->EVE15 * QUANTITY * METRO/100
             SELECT 6
             SKIP
             SELECT 3
             REPLACE EVE_MCI WITH USE_EVE*F->EVE15 * QUANTITY
     * (100-METRO)/100 + EVE_MCI
       ENDCASE

       SELECT 6
       SKIP -1
       SELECT 3

       REPLACE NIGHT_MCI WITH (USE_NIGHT * F->WEEKEND * QUANTITY) * METRO/100
       SELECT 6
       SKIP
       SELECT 3
       REPLACE NIGHT_MCI WITH (USE_NIGHT * F->WEEKEND * QUANTITY)
```

```
* (100-METRO)/100 + NIGHT_MCI

        REPLACE ACCES_MCI WITH MCI_ACCESS * QUANTITY

        IF DAY_MCI + EVE_MCI + NIGHT_MCI >= QUANTITY*MCI_MIN
            REPLACE  MCI_TOTAL WITH DAY_MCI+EVE_MCI+NIGHT_MCI+ACCES_MCI
        ELSE
            REPLACE MCI_TOTAL WITH QUANTITY*MCI_MIN + ACCES_MCI
        ENDIF

    SKIP
ENDDO

SUM MCI_TOTAL TO MCI_TOTE

IF MCI_TOTE < MCILOWCOS
    MCILOWCOS = MCI_TOTE
    SELECT 3
    USE
    SELECT 6
    USE MCIOUT
    ZAP
    APPEND FROM \NEWNET\RESULTS
    SELECT 3
    USE RESULTS
ENDIF

SAVE TO \NEWNET\TEMP
RETURN


SET ECHO OFF
```

```
TYPE \NEWNET\SKYLINE.PRG



CLEAR ALL
RESTORE FROM TEMP
SELECT 2
USE \RESULTS\&FILE
SELECT 5
USE POISSON
SELECT 6
USE SKYLINE
SELECT 7
USE \TABLES\SBSOUT

PEAKTOTAL = PEAKHR1 + PEAKHR2 + PEAKHR3 + PEAKHR4 + PEAKHR5 + PEAKHR6

SELECT 2
SUM USE_DAY * QUANTITY  TO DAYTOTAL FOR OUT
SUM (USE_EVE + USE_NIGHT) * QUANTITY TO NIGHTTOTAL FOR OUT
GOTO TOP

SELECT 5
LOCATE FOR &P >= PEAKTOTAL

SELECT 6
ZAP
USEAVG = (DAYTOTAL + NIGHTTOTAL)/E->TRUNKS
RESTORE FROM \TABLES\CONSTANT ADDITIVE

TIERNUM = 1

DO WHILE TIERNUM <= 4
    APPEND BLANK
    REPLACE SBS_LINES WITH E->TRUNKS
    REPLACE ACCES_SBS WITH SBS_ACCESS * SBS_LINES
    REPLACE TIER WITH B->TIER
    REPLACE PERCENT WITH B->PERCENT
    REPLACE SBSHRS_DAY WITH DAYTOTAL * PERCENT/100
    REPLACE SBSHRS_EVE WITH NIGHTTOTAL * PERCENT/100
    SELECT 7
    LOCATE FOR USAGE_HRS > USEAVG .OR. EOF()
    SKIP -1
    SELECT 6
    NAME = 'TIER' + STR(TIER,1,0) + '_DAY'
    REPLACE DAY_SBS WITH SBSHRS_DAY * G->&NAME * 0.6
    NAME = 'TIER' + STR(TIER,1,0) + '_OTHR'
```

```
    REPLACE NIGHT_SBS WITH SBSHRS_EVE * G->&NAME * 0.6

    TIERNUM = TIERNUM + 1
    SELECT 2
    SKIP
    SELECT 6
ENDDO


SUM DAY_SBS + NIGHT_SBS TO TOTAL_SBS
GOTO TOP

IF USEAVG < SBS_HRSMIN .AND. TOTAL_SBS < SBS_MIN* SBS_LINES
    REPLACE SBS_TOTAL WITH SBS_MIN * SBS_LINES + ACCES_SBS
ELSE
    REPLACE SBS_TOTAL WITH TOTAL_SBS + ACCES_SBS


RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\SPRNTOUT.PRG



RESTORE FROM TEMP
SELECT 4
USE
SELECT 1
USE SPRNTOUT ALIAS SPRNT
ZAP
APPEND FROM NEWNET
GOTO TOP

DO WHILE .NOT. EOF()
    REPLACE QUANTITY WITH E->TRUNKS
    REPLACE USE_DAY WITH USE_DAY/QUANTITY * FACTOR
    REPLACE USE_EVE WITH USE_EVE/QUANTITY * FACTOR
    REPLACE USE_NIGHT WITH USE_NIGHT/QUANTITY * FACTOR
    SKIP
ENDDO

GOTO TOP
DO WHILE .NOT. EOF()
        SELECT 6 ALIAS SPRNT
        USE \TABLES\SPRNTOUT
        LOCATE FOR BAND = A->BAND
        SELECT 1
        DO CASE
            CASE USE_DAY >= 100
                REPLACE DAY_SPNT WITH (F->DAY0_40*40 + F->DAY40_70*30 +
               F->DAY70_100*30 + (USE_DAY-100)*F->DAY100PLUS) * QUANTITY
              * METRO/100
                SELECT 6
                SKIP
                SELECT 1
                REPLACE DAY_SPNT WITH (F->DAY0_40*40 + F->DAY40_70*30 +
             F->DAY70_100*30 + (USE_DAY-100)*F->DAY100PLUS) * QUANTITY
           * (100-METRO)/100 + DAY_SPNT
            CASE 70 < USE_DAY .AND. USE_DAY < 100
                REPLACE DAY_SPNT WITH (F->DAY0_40*40 + F->DAY40_70*30 +
             (USE_DAY-70)*F->DAY70_100) * QUANTITY * METRO/100
                SELECT 6
                SKIP
                SELECT 1
                REPLACE DAY_SPNT WITH (F->DAY0_40*40 + F->DAY40_70*30 +
             (USE_DAY-70)*F->DAY70_100) * QUANTITY * (100-METRO)/100 +
            DAY_SPNT
```

```
          CASE 40 < USE_DAY .AND. USE_DAY <= 70
              REPLACE DAY_SPNT WITH (F->DAY0_40*40 +                    (USE
_DAY-40)*F->DAY40_70)                    * QUANTITY * METRO/100
              SELECT 6
              SKIP
              SELECT 1
              REPLACE DAY_SPNT WITH (F->DAY0_40*40 +                    (USE
_DAY-40)*F->DAY40_70)                    * QUANTITY * (100-METRO)/100 + DAY_SP
NT
          CASE USE_DAY <= 40
              REPLACE DAY_SPNT WITH USE_DAY*F->DAY0_40 * QUANTITY * METRO/100
              SELECT 6
              SKIP
              SELECT 1
              REPLACE DAY_SPNT WITH USE_DAY*F->DAY0_40 * QUANTITY
       * (100-METRO)/100 + DAY_SPNT
       ENDCASE
       SELECT 6
       SKIP -1
       SELECT 1

       DO CASE
          CASE USE_EVE >= 100
              REPLACE EVE_SPNT WITH (F->EVE0_40*40 + F->EVE40_70*30 +
        F->EVE70_100*30 + (USE_EVE-100)*F->EVE100PLUS) * QUANTITY
      * METRO/100
              SELECT 6
              SKIP
              SELECT 1
              REPLACE EVE_SPNT WITH (F->EVE0_40*40 + F->EVE40_70*30 +
        F->EVE70_100*30 + (USE_EVE-100)*F->EVE100PLUS) * QUANTITY
      * (100-METRO)/100 + EVE_SPNT
          CASE 70 < USE_EVE .AND. USE_EVE < 100
              REPLACE EVE_SPNT WITH (F->EVE0_40*40 + F->EVE40_70*30 +
         (USE_EVE-70)*F->EVE70_100) * QUANTITY * METRO/100
              SELECT 6
              SKIP
              SELECT 1
              REPLACE EVE_SPNT WITH (F->EVE0_40*40 + F->EVE40_70*30 +
         (USE_EVE-70)*F->EVE70_100) * QUANTITY * (100-METRO)/100 +
          EVE_SPNT
          CASE 40 < USE_EVE .AND. USE_EVE <= 70
              REPLACE EVE_SPNT WITH (F->EVE0_40*40 +                    (USE
_EVE-40)*F->EVE40_70)                    * QUANTITY * METRO/100
              SELECT 6
              SKIP
              SELECT 1
              REPLACE EVE_SPNT WITH (F->EVE0_40*40 +                    (USE
_EVE-40)*F->EVE40_70) * QUANTITY * (100-METRO)/100                  + EVE_SP
NT
          CASE USE_EVE <= 40
              REPLACE EVE_SPNT WITH USE_EVE*F->EVE0_40 * QUANTITY * METRO/100
```

```
            SELECT 6
            SKIP
            SELECT 1
            REPLACE EVE_SPNT WITH USE_EVE*F->EVE0_40 * QUANTITY
     * (100-METRO)/100 + EVE_SPNT
        ENDCASE

        SELECT 6
        SKIP -1
        SELECT 1

        REPLACE NIGHT_SPNT WITH (USE_NIGHT * F->WEEKEND * QUANTITY) * METRO/100
        SELECT 6
        SKIP
        SELECT 1
        REPLACE NIGHT_SPNT WITH (USE_NIGHT * F->WEEKEND * QUANTITY)
 * (100-METRO)/100 + NIGHT_SPNT



    SKIP
ENDDO

SELECT 1
SUM DAY_SPNT + EVE_SPNT + NIGHT_SPNT TO TOTAL_SPNT
GOTO TOP
REPLACE ACCES_SPNT WITH SPNTACCESS * QUANTITY

IF TOTAL_SPNT/QUANTITY < SPRNT_MIN
    REPLACE SPNT_TOTAL WITH SPRNT_MIN * QUANTITY + ACCES_SPNT
ELSE
    REPLACE SPNT_TOTAL WITH TOTAL_SPNT + ACCES_SPNT
ENDIF
SAVE TO \NEWNET\TEMP
RETURN


SET ECHO OFF
```

```
TYPE \NEWNET\OUTSTORE.PRG



CLEAR ALL
RESTORE FROM TEMP
RESTORE FROM \RESULTS\&FILENAME ADDITIVE
RESTORE FROM TEMP ADDITIVE
SAVE ALL LIKE PEAKHR? TO \NEWNET\TEMP2
RELEASE ALL EXCEPT ?I*
RELEASE NIGHTSUM, LINES
RESTORE FROM TEMP2 ADDITIVE
SAVE TO \NEWNET\TEMP2
RESTORE FROM TEMP
RELEASE ALL EXCEPT MAX
RESTORE FROM TEMP2 ADDITIVE
SAVE TO \NEWNET\TEMP2
RESTORE FROM TEMP
RELEASE ALL EXCEPT METRO
RESTORE FROM TEMP2 ADDITIVE
OPTIMIZE = .T.
P_OUT = HIGH_P

IF HIGH_P < 10
   FIELDOUT = "P" + STR(HIGH_P,1,0)
ELSE
   FIELDOUT = "P" + STR(HIGH_P,2,0)
ENDIF


MAXOUT = MAX
PEAKHR1OUT = PEAKHR1
PEAKHR2OUT = PEAKHR2
PEAKHR3OUT = PEAKHR3
PEAKHR4OUT = PEAKHR4
PEAKHR5OUT = PEAKHR5
PEAKHR6OUT = PEAKHR6
RELEASE HIGH_P, FIELD, MAX
RELEASE ALL LIKE PEAKHR?
SAVE TO \RESULTS\&FILENAME

NAME = FILENAME + '.ATT'
COPY FILE AT&TOUT.DBF TO \RESULTS\&NAME
NAME = FILENAME + '.MCI'
COPY FILE MCIOUT.DBF TO \RESULTS\&NAME
NAME = FILENAME + '.SPT'
COPY FILE SPRNTOUT.DBF TO \RESULTS\&NAME
```

```
NAME = FILENAME + '.SBS'
COPY FILE SKYLINE.DBF TO \RESULTS\&NAME
NAME = FILENAME + '.NEW'
COPY FILE NEWNET.DBF TO \RESULTS\&NAME

RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\INWATS.PRG



CLEAR ALL
RESTORE FROM TEMP
RELEASE ALL EXCEPT FILE*
USE \RESULTS\&FILE
COPY TO \NEWNET\NEWNET FIELDS BAND, OUT, QUANTITY, USE_DAY,     USE_EVE, USE_NI
GHT FOR .NOT. OUT
LOCATE FOR .NOT. OUT .AND. BAND > 0

DO WHILE BAND > 0 .AND. .NOT. EOF()
    SKIP
ENDDO

SKIP -1
MAX = BAND
ROW = 5
PEAKHR1 = 0.0
PEAKHR2 = 0.0
PEAKHR3 = 0.0
PEAKHR4 = 0.0
PEAKHR5 = 0.0
PEAKHR6 = 0.0
NUMBER  = 1
CLEAR
@ 2,5 SAY "ENTER TOTAL PEAK HOUR IN WATS TRAFFIC IN MINUTES FOR EACH BAND:"

DO WHILE NUMBER <= MAX
    TEMP = "PEAKHR" + STR(NUMBER,1,0)
    @ ROW,10 SAY "BAND" + STR(NUMBER,1,0) + ":  " GET &TEMP PICTURE "999.9"
    NUMBER = NUMBER + 1
    ROW = ROW + 2

ENDDO

READ

USE NEWNET
ROW = 4
HIGH_P = 0
TEMP = 0
PEAKNUM = 1
LOCATE FOR BAND > TEMP
```

```
DO WHILE .NOT. OUT .AND. .NOT. EOF()
    TEMP = BAND
    PEAKTOTAL = 0

    DO WHILE PEAKNUM <= TEMP
        NAMEPK = "PEAKHR" + STR(PEAKNUM,1,0)
        PEAKTOTAL = PEAKTOTAL + &NAMEPK
        PEAKNUM = PEAKNUM + 1
    ENDDO




    SUM  QUANTITY TO LINES FOR BAND = TEMP .AND. .NOT. OUT
    SELECT 2
    USE POISSON
    LOCATE FOR TRUNKS = LINES
    NUMBER = 1
    FLAG = .T.

    DO WHILE NUMBER <= 50 .AND. FLAG
        IF NUMBER > 9
            FIELD = "P" + STR(NUMBER,2,0)
        ELSE
            FIELD = "P" + STR(NUMBER,1,0)
        ENDIF

        IF &FIELD >= PEAKTOTAL
            FLAG = .F.
        ENDIF

        NUMBER = NUMBER + 1
    ENDDO
    @ ROW,40 SAY "BAND" + STR(TEMP,1,0) + " TRUNKS:  " GET FIELD

    IF NUMBER -1 >  HIGH_P
        HIGH_P = NUMBER -1
    ENDIF

    ROW = ROW + 2
    SELECT 1
    LOCATE FOR BAND > TEMP
ENDDO

CLEAR GETS

FLAG = .T.
DO WHILE FLAG
    TEMP2 = HIGH_P
    @ 20,5 SAY 'PRESS RETURN KEY TO USE DEFAULT "P" VALUE OR ENTER YOUR OWN:  '
        GET HIGH_P PICTURE "99"
    READ
```

```
    IF HIGH_P <= 50 .AND. HIGH_P >= 1
        FLAG = .F.
    ELSE
        HIGH_P = TEMP2
        @ 22,5 SAY '"P" VALUE MUST BE 1 THRU 50.  REENTER VALUE.'
    ENDIF
ENDDO

WAIT

USE NEWNET
ZAP
NUMBER = 1

DO WHILE NUMBER <= MAX
    APPEND BLANK
    REPLACE BAND WITH NUMBER
    REPLACE OUT WITH .F.
    NUMBER = NUMBER + 1
ENDDO

CLEAR
GOTO TOP
@ 5,10 SAY "ENTER ACTUAL MEASURED TRAFFIC IN HOURS PER MONTH:"

DO WHILE .NOT. EOF()
    @ 11,10 SAY "BAND" + STR(BAND,1,0)
    @ 13,10 SAY "          DAY:"  GET USE_DAY
    @ 15,10 SAY "      EVENING:"  GET USE_EVE
    @ 17,10 SAY "NIGHT/WEEKEND:"  GET USE_NIGHT
    READ
    SKIP
ENDDO

WAIT
SAVE TO \NEWNET\TEMP
DO INCPUTE
RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\INCPUTE.PRG



RESTORE FROM TEMP
CLEAR
USE POSSIBLE

DO CASE
    CASE MAX = 1
        LOCATE FOR ONE .AND. .NOT. TWO .AND. .NOT. THREE .AND.            .NOT
. FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'TAKE A 5 MINUTE BREAK WHILE I DO SOME WORK.'
    CASE MAX = 2
        LOCATE FOR TWO .AND. .NOT. THREE .AND. .NOT. FOUR .AND.            .NO
T. FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'TAKE A 5 MINUTE BREAK WHILE I DO SOME WORK.'
    CASE MAX = 3
        LOCATE FOR THREE .AND. .NOT. FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'TAKE A 5 MINUTE BREAK WHILE I DO SOME WORK.'
    CASE MAX = 4
        LOCATE FOR FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'TAKE A 10 MINUTE BREAK WHILE I DO SOME WORK.'
    CASE MAX = 5
        LOCATE FOR FIVE .AND. .NOT. SIX
        @ 23,5 SAY 'TAKE A 15 MINUTE BREAK WHILE I DO SOME WORK.'
    CASE MAX = 6
        LOCATE FOR SIX
        @ 23,5 SAY 'COME BACK IN 30 MINUTES.'
ENDCASE

SELECT 2
USE \RESULTS\&FILE
STORE 9999999999 TO ATTLOWCOS

SELECT 3
USE RESULTS

SELECT 1
LASTCOUNT = 0

DO WHILE .NOT. EOF()
    DO CASE
        CASE MAX = 1
            LOCATE FOR ONE .AND. .NOT. TWO .AND. .NOT. THREE .AND.
     .NOT. FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
        CASE MAX = 2
```

```
            LOCATE FOR TWO .AND. .NOT. THREE .AND. .NOT. FOUR .AND.
        .NOT. FIVE .AND. .NOT. SIX
          CASE MAX = 3
            LOCATE FOR THREE .AND. .NOT. FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
          CASE MAX = 4
            LOCATE FOR FOUR .AND. .NOT. FIVE .AND. .NOT. SIX
          CASE MAX = 5
            LOCATE FOR FIVE .AND. .NOT. SIX
          CASE MAX = 6
            LOCATE FOR SIX
        ENDCASE

        COUNTER = 0
        DO WHILE COUNTER < LASTCOUNT .AND. .NOT. EOF()
            CONTINUE
            COUNTER = COUNTER + 1
        ENDDO

        LASTCOUNT = LASTCOUNT + 1

        @ 23,5 SAY "CALCULATING AT&T COST FOR CONFIGURATION " +        STR(LASTCOU
    NT,2,0) + "."

        IF .NOT. EOF()
            SELECT 3
            ZAP

            IF A->ONE
                APPEND BLANK
                REPLACE BAND WITH 1
            ENDIF

            IF A->TWO
                APPEND BLANK
                REPLACE BAND WITH 2
            ENDIF

            IF A->THREE
                APPEND BLANK
                REPLACE BAND WITH 3
            ENDIF

            IF A->FOUR
                APPEND BLANK
                REPLACE BAND WITH 4
            ENDIF

            IF A->FIVE
                APPEND BLANK
                REPLACE BAND WITH 5
            ENDIF
```

```
        IF A->SIX
            APPEND BLANK
            REPLACE BAND WITH 6
        ENDIF
        SAVE TO \NEWNET\TEMP

        DO INLINES

        SELECT 3
        DO AT&TIN
        RESTORE FROM TEMP ADDITIVE
        SELECT 1
    ENDIF
ENDDO

@ 23,5 SAY "STORING THE RESULTS."
DO INSTORE
RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\INLINES.PRG



RESTORE FROM TEMP
LASTBAND = 0
SELECT 4
USE NEWNET
SUM USE_DAY + USE_EVE + USE_NIGHT TO SUMEASURED
GOTO TOP
SELECT 2
SUM (USE_DAY + USE_EVE + USE_NIGHT) * QUANTITY TO SUMBILLED FOR .NOT. OUT
FACTOR = SUMBILLED/SUMEASURED


SELECT 3
GOTO TOP

DO WHILE .NOT. EOF()
    NUMBER = LASTBAND + 1
    STORE 0 TO PEAKSUM, DAYSUM, EVESUM, NIGHTSUM

    DO WHILE NUMBER <= BAND
        NAME = "PEAKHR" + STR(NUMBER,1,0)
        PEAKSUM = PEAKSUM + &NAME
        NUMBER = NUMBER + 1
    ENDDO

    SELECT 4
    DO WHILE BAND <= C->BAND .AND. .NOT. EOF()
        DAYSUM = DAYSUM + USE_DAY
        EVESUM = EVESUM + USE_EVE
        NIGHTSUM = NIGHTSUM + USE_NIGHT
        SKIP
    ENDDO


    SELECT 5
    USE POISSON

    IF HIGH_P <= 9
        P = "P" + STR(HIGH_P,1,0)
    ELSE
        P = "P" + STR(HIGH_P,2,0)
    ENDIF
```

```
    LOCATE FOR &P >= PEAKSUM
    SELECT 3
    REPLACE QUANTITY WITH E->TRUNKS
    REPLACE USE_DAY WITH DAYSUM/QUANTITY * FACTOR
    REPLACE USE_EVE WITH EVESUM/QUANTITY * FACTOR
    REPLACE USE_NIGHT WITH NIGHTSUM/QUANTITY * FACTOR
    LASTBAND = BAND
    SKIP
ENDDO

SAVE TO \NEWNET\TEMP

RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\AT&TIN.PRG


RESTORE FROM TEMP
RESTORE FROM \TABLES\CONSTANT ADDITIVE

SELECT 6
USE \TABLES\AT&TIN


SELECT 3
GOTO TOP
DO WHILE .NOT. EOF()
    SELECT 6
    LOCATE FOR BAND = C->BAND
    SELECT 3
    DO CASE
        CASE USE_DAY >= 80
           REPLACE DAY_ATT WITH (F->DAY15*15 + F->DAY25*25 + F->DAY40*40 +
                          (USE_DAY-80)*F->DAY80) * QUANTITY
        CASE 40 < USE_DAY .AND. USE_DAY < 80
           REPLACE DAY_ATT WITH (F->DAY15*15 + F->DAY25*25 +
               (USE_DAY-40)*F->DAY40) * QUANTITY
        CASE 15 < USE_DAY .AND. USE_DAY <= 40
           REPLACE DAY_ATT WITH (F->DAY15*15 + (USE_DAY-15)*F->DAY25)
                        *  QUANTITY
        CASE USE_DAY <= 15
           REPLACE DAY_ATT WITH USE_DAY*F->DAY15 * QUANTITY
    ENDCASE

    DO CASE
        CASE USE_EVE >= 80
            REPLACE EVE_ATT WITH (F->EVE15*15 + F->EVE25*25 +
            F->EVE40*40 + (USE_EVE-80)*F->EVE80) * QUANTITY
        CASE 40 < USE_EVE .AND. USE_EVE < 80
            REPLACE EVE_ATT WITH (F->EVE15*15 + F->EVE25*25 +
            (USE_EVE-40)*F->EVE40) * QUANTITY
        CASE 15 < USE_EVE .AND. USE_EVE <= 40
            REPLACE EVE_ATT WITH (F->EVE15*15 +                                (U
SE_EVE-15)*F->EVE25) * QUANTITY
        CASE USE_EVE <= 15
            REPLACE EVE_ATT WITH USE_EVE*F->EVE15 * QUANTITY
    ENDCASE

    REPLACE NIGHT_ATT WITH (USE_NIGHT * F->WEEKEND * QUANTITY)
    REPLACE ACCES_ATT WITH F->ACCESS * QUANTITY
```

```
    IF DAY_ATT + EVE_ATT + NIGHT_ATT >= QUANTITY*ATT_MININ
        REPLACE ATT_TOTAL WITH DAY_ATT+EVE_ATT+NIGHT_ATT+ACCES_ATT
    ELSE
        REPLACE ATT_TOTAL WITH QUANTITY*ATT_MININ + ACCES_ATT
    ENDIF

    SKIP
ENDDO

SUM ATT_TOTAL TO ATT_TOTE

IF ATT_TOTE < ATTLOWCOS
    ATTLOWCOS = ATT_TOTE
    SELECT 3
    USE
    SELECT 6
    USE AT&TIN
    ZAP
    APPEND FROM \NEWNET\RESULTS
    SELECT 3
    USE RESULTS
ENDIF
SAVE ALL EXCEPT METRO TO \NEWNET\TEMP
RETURN


SET ECHO OFF
```

```
TYPE \NEWNET\INSTORE.PRG


CLEAR ALL
RESTORE FROM TEMP
RESTORE FROM \RESULTS\&FILENAME ADDITIVE
RESTORE FROM TEMP ADDITIVE
SAVE ALL LIKE PEAKHR? TO \NEWNET\TEMP2
RESTORE FROM TEMP
RELEASE ALL EXCEPT ?1*
RELEASE NIGHTSUM, LINES
RESTORE FROM TEMP2 ADDITIVE
SAVE TO \NEWNET\TEMP2
RESTORE FROM TEMP
RELEASE ALL EXCEPT MAX
RESTORE FROM TEMP2 ADDITIVE
OPTIMIZE = .T.
P_IN = HIGH_P

IF HIGH_P < 10
    FIELDIN = "P" + STR(HIGH_P,1,0)
ELSE
    FIELDIN = "P" + STR(HIGH_P,2,0)
ENDIF

MAXIN = MAX
PEAKHR1IN = PEAKHR1
PEAKHR2IN = PEAKHR2
PEAKHR3IN = PEAKHR3
PEAKHR4IN = PEAKHR4
PEAKHR5IN = PEAKHR5
PEAKHR6IN = PEAKHR6
RELEASE HIGH_P, FIELD, MAX
RELEASE ALL LIKE PEAKHR?
SAVE TO \NEWNET\TEMP2
RESTORE FROM TEMP2
RESTORE FROM \RESULTS\&FILENAME
RESTORE FROM TEMP2 ADDITIVE
SAVE TO \RESULTS\&FILENAME

NAME = FILENAME + '.TIN'
COPY FILE AT&TIN.DBF TO \RESULTS\&NAME
NAME = FILENAME + '.NEW'
USE \RESULTS\&FILENAME

IF OUT
```

```
    USE \RESULTS\&NAME
    APPEND FROM NEWNET
ELSE
    USE NEWNET
    COPY TO \RESULTS\&NAME
ENDIF

RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\OUTPUT.PRG


DO WHILE .T.
    CLEAR
    STORE " " TO CHOICE
    @  8,25 SAY "-1- DISPLAY RESULTS ON SCREEN."
    @ 10,25 SAY "-2- PRINT OUT THE RESULTS."
    @ 13,25 SAY "-0- FINISHED."
    @ 17,25 SAY "CHOOSE ONE:"  GET CHOICE PICTURE "9"
    READ

    DO CASE
        CASE CHOICE = "1"
            RESTORE FROM TEMP
            DO DISPLAY
        CASE CHOICE = "2"
            RESTORE FROM TEMP
            DO PRINT
        CASE CHOICE = "0"
            RETURN
    ENDCASE

ENDDO

SET ECHO OFF
```

```
TYPE \NEWNET\DISPLAY.PRG


CLEAR
TEXT


                        OPTIMIZED RESULTS


      A report summary will be displayed for each carrier.
      The display will wait between reports.  Press <Ctrl><S>
      to stop the scrolling.  Press <Ctrl><S> again to resume.


ENDTEXT
WAIT
CLEAR
USE \RESULTS\&FILENAME
RESTORE FROM \RESULTS\&FILENAME

IF OUT
   DO DISPATT
   DO DISPMCI
   DO DISPSPNT
   DO DISPSBS
   DO DISPOUT
ENDIF


USE \RESULTS\&FILENAME
LOCATE FOR .NOT. OUT

IF BAND > 0
   CLEAR
   DO DISPTIN
   DO DISPIN
ENDIF

RETURN


SET ECHO OFF
```

```
TYPE \NEWNET\DISPATT.PRG



CLEAR
NAME = FILENAME + ".ATT"
USE \RESULTS\&NAME

RESTORE FROM \TABLES\CONSTANT ADDITIVE
SUM QUANTITY TO NUMLINES
SELECT 2
USE \TABLES\AT&TOUT

IF NUMLINES = 0
    CONECTOTAL = 0
ELSE
    CONECTOTAL = CONNECT1 + (NUMLINES-1)*CONNECT2
ENDIF

SELECT 1
LINE1 = "     Access charge is $" + STR(B->ACCESS,6,2) + " per line."
LINE2 = "     Connection charge is $" + STR(B->CONNECT1,6,2) + " for the first
line and "
LINE3 = "     $" + STR(B->CONNECT2,6,2) + " for each successive line."
LINE4 = "     Total connection charge for this configuration is $" + STR(CONECT
OTAL,7,2) + "."
LINE5 = "     Minimum usage charge is $" + STR(ATT_MIN,6,2) + " per line exclus
ive of access charges."

REPORT FORM \NOWNET\AT&TOUT HEADING "OPTIMIZED CONFIGURATION: " + FIELDOUT
WAIT
?
?
?
? LINE1
? LINE2
? LINE3
? LINE4

IF ATT_MIN > 0
   ? LINE5
ELSE
ENDIF
WAIT
RETURN
```

```
TYPE \NEWNET\DISPMCI.PRG
CLEAR
NAME = FILENAME + ".MCI"
USE \RESULTS\&NAME
RESTORE FROM \TABLES\CONSTANT ADDITIVE
SUM QUANTITY TO NUMLINES
IF NUMLINES = 0
    CONECTOTAL = 0
ELSE
    CONECTOTAL = MCICONNECT * NUMLINES
ENDIF


LINE1 = "     Access charge is $" + STR(MCI_ACCESS,6,2) + " per line."
LINE2 = "     Connection charge is $" + STR(MCICONNECT,6,2) + " per line."
LINE3 = "     Total connection charge for this configuration is $"     + STR(CO
NECTOTAL,7,2) + "."
LINE4 = "     Minimum usage charge is $" + STR(MCI_MIN,6,2) +      " per line e
xclusive of access charges."

REPORT FORM \NOWNET\MCIOUT HEADING "           OPTIMIZED CONFIGURATION: "
+ FIELDOUT +  "           " + "("  + STR(METRO,3,0) + "% ON-NET/" +
  STR(100-METRO,3,0) + "% OFF-NET" + ")"
WAIT
?
?
?
? LINE1
? LINE2
? LINE3
IF MCI_MIN > 0
    ? LINE4
ELSE
ENDIF
WAIT

RETURN

SET ECHO OFF
```

```
TYPE \NEWNET\DISPSPNT.PRG



CLEAR
NAME = FILENAME + ".SPT"
USE \RESULTS\&NAME
RESTORE FROM \TABLES\CONSTANT ADDITIVE
IF QUANTITY = 0
    CONECTOTAL = 0
ELSE
    CONECTOTAL = SPNTCONECT * QUANTITY
ENDIF

LINE1 = "     Access charge is $" + STR(SPNTACCESS,6,2) + " per line."
LINE2 = "     Total monthly access charge for this configuration is $"     + ST
R(SPNTACCESS * QUANTITY,7,2) + "."
LINE3 = "     Connection charge is $" + STR(SPNTCONECT,6,2) + " per line."
LINE4 = "     Total connection charge for this configuration is $"     + STR(CO
NECTOTAL,7,2) + "."
LINE5 = "     Minimum usage charge is $" + STR(SPRNT_MIN,6,2) +      "per line
exclusive of access charges."
LINE6 = "     Total monthly cost for this configuration is $" + STR(SPNT_TOTAL,
12,2) + "."

REPORT FORM SPRNTOUT HEADING "           OPTIMIZED CONFIGURATION: "    + FIELD
OUT + "           " + "(" + STR(METRO,3,0) + "% ON-NET/"     + STR(100-METRO,3
,0) + "% OFF-NET" + ")"
WAIT
?
?
?
? LINE1
? LINE2
?
? LINE3
? LINE4
?
IF SPRNT_MIN > 0
    ? LINE5
    ?
ELSE
ENDIF
? LINE6
?
WAIT
RETURN
```

```
TYPE \NEWNET\DISPSBS.PRG


CLEAR
NAME = FILENAME + ".SBS"
USE \RESULTS\&NAME
RESTORE FROM \TABLES\CONSTANT ADDITIVE
LINE1 = "     Access charge is $" + STR(SBS_ACCESS,6,2) + " per line."
LINE2 = "     Total monthly access charge for this configuration is $" + STR(AC
CES_SBS,7,2) + "."
LINE3 = "     Minimum usage charge is $" + STR(SBS_MIN,6,2) +      " if average
 use is less than " + STR(SBS_HRSMIN,3,0) + " hours/line."
LINE4 = "     Total monthly cost for this configuration is $" +     STR(SBS_TOT
AL,11,2) + "."
LINE5 = "     Connection charges per line are based on the distance between you
r"
LINE6 = "     exchange carrier wire center and the SBS Skyline WATS access poin
t."
REPORT FORM \NOWNET\SBSOUT HEADING "OPTIMIZED CONFIGURATION: " + FIELDOUT
WAIT
?
?
?
? LINE1
? LINE2
IF SBS_MIN > 0
    ?
    ? LINE3
ELSE
ENDIF
? LINE4
?
? LINE5
? LINE6
USE \TABLES\SBSCONEC
SET MARGIN TO 30
?
?
?
DISPLAY OFF ALL
?
SET MARGIN TO 0
WAIT

RETURN
```

```
TYPE \NEWNET\DISPOUT.PRG



CLEAR
NAME = FILENAME + ".NEW"
USE \RESULTS\&NAME
LINE0 = '                    OUT WATS                          OUT WATS'
LINE1 = '              BUSY HOUR TRAFFIC                 MONTHLY TRAFFIC'
LINE2 = '                  (Minutes)                        (Hours)'
LINE3 = '                                          DAY       EVENING    NIGHT/WEEKE
ND'
NUMBER = 1

DO WHILE NUMBER <= MAXOUT
    PEAKNAME = 'PEAKHR' + STR(BAND,1,0) + 'OUT'
    LINENAME = 'LINE' + STR(BAND + 3,1,0)
    &LINENAME = '    BAND ' + STR(BAND,1,0) + '       ' +         STR(&PEAKNAME
,6,1) + '             ' + STR(USE_DAY,6,2) + '      ' +         STR(USE_EVE,6,2
) + '        ' + STR(USE_NIGHT,6,2)

    SKIP
    NUMBER = NUMBER + 1
ENDDO

GOTO TOP

?
?
? LINE0
? LINE1
? LINE2
? LINE3
?

NUMBER = 1

DO WHILE NUMBER <= MAXOUT
    LINENAME = 'LINE' + STR(BAND + 3,1,0)
    ? &LINENAME
    SKIP
    NUMBER = NUMBER + 1
ENDDO

WAIT
RETURN
```

```
TYPE \NEWNET\DISPTIN.PRG



CLEAR
NAME = FILENAME + ".TIN"
USE \RESULTS\&NAME
RESTORE FROM \TABLES\CONSTANT ADDITIVE
SUM QUANTITY TO NUMLINES
SELECT 2
USE \TABLES\AT&TIN

IF NUMLINES = 0
    CONECTOTAL = 0
ELSE
    CONECTOTAL = CONNECT1 + (NUMLINES) *CONNECT2
ENDIF


SELECT 1
LINE1 = "     Access charge is $" + STR(B->ACCESS,6,2) + " per line."
LINE2 = "     Connection charge is $" + STR(B->CONNECT1,6,2) + " for the first
line and "
LINE3 = "     $" + STR(B->CONNECT2,6,2) + " for each successive line."
LINE4 = "     Total connection charge for this configuration is $"  + STR(CONEC
TOTAL,7,2) + "."
LINE5 = "     Minimum usage charge is $" + STR(ATT_MININ,6,2) + " per line excl
usive of access charges."


REPORT FORM \NOWNET\AT&TIN HEADING "OPTIMIZED CONFIGURATION: " + FIELDIN
WAIT
?
?
?
? LINE1
? LINE2
? LINE3
? LINE4

IF ATT_MININ > 0
    ? LINE5
ELSE
ENDIF
WAIT

RETURN
```

```
TYPE \NEWNET\DISPIN.PRG



CLEAR
NAME = FILENAME + ".NEW"
USE \RESULTS\&NAME
LINE0 = '                  IN WATS                        IN WATS'
LINE1 = '             BUSY HOUR TRAFFIC              MONTHLY TRAFFIC'
LINE2 = '                 (Minutes)                      (Hours)'
LINE3 = '                                        DAY       EVENING    NIGHT/WEEKE
ND'
NUMBER = 1
LOCATE FOR .NOT. OUT

DO WHILE NUMBER <= MAXIN
    PEAKNAME = 'PEAKHR' + STR(BAND,1,0) + 'IN'
    LINENAME = 'LINE' + STR(BAND + 3,1,0)
    &LINENAME = '    BAND ' + STR(BAND,1,0) + '       ' +        STR(&PEAKNAME
,6,1) + '             ' + STR(USE_DAY,6,2) + '      ' +        STR(USE_EVE,6,2
) + '        ' + STR(USE_NIGHT,6,2)

    SKIP
    NUMBER = NUMBER + 1
ENDDO

LOCATE FOR .NOT. OUT

?
?
? LINE0
? LINE1
? LINE2
? LINE3
?

NUMBER = 1

DO WHILE NUMBER <= MAXIN
    LINENAME = 'LINE' + STR(BAND + 3,1,0)
    ? &LINENAME
    SKIP
    NUMBER = NUMBER + 1
ENDDO

WAIT
RETURN
```

```
TYPE \NEWNET\PRINT.PRG


CLEAR
TEXT


                        OPTIMIZED RESULTS


                    Align Paper and Turn on Printer

ENDTEXT
WAIT
CLEAR
USE \RESULTS\&FILENAME
RESTORE FROM \RESULTS\&FILENAME

IF OUT
    DO PRNTATT
    DO PRNTMCI
    DO PRNTSPNT
    DO PRNTSBS
    DO PRNTOUT
ENDIF


USE \RESULTS\&FILENAME
LOCATE FOR .NOT. OUT

IF BAND > 0
    CLEAR
    DO PRNTTIN
    DO PRNTIN
ENDIF

RETURN


SET ECHO OFF
```

```
TYPE \NEWNET\PRNTATT.PRG


CLEAR
NAME = FILENAME + ".ATT"
USE \RESULTS\&NAME
RESTORE FROM \TABLES\CONSTANT ADDITIVE
SUM QUANTITY TO NUMLINES
SELECT 2
USE \TABLES\AT&TOUT

IF NUMLINES = 0
   CONECTOTAL = 0
ELSE
   CONECTOTAL = CONNECT1 + (NUMLINES-1)*CONNECT2
ENDIF

SELECT 1
LINE1 = "     Access charge is $" + STR(B->ACCESS,6,2) + " per line."
LINE2 = "     Connection charge is $" + STR(B->CONNECT1,6,2) + " for the first
line and "
LINE3 = "     $" + STR(B->CONNECT2,6,2) + " for each successive line."
LINE4 = "     Total connection charge for this configuration is $" + STR(CONECT
OTAL,7,2) + "."
LINE5 = "     Minimum usage charge is $" + STR(ATT_MIN,6,2) + " per line exclus
ive of access charges."

REPORT FORM \NOWNET\AT&TOUT HEADING "OPTIMIZED CONFIGURATION: " + FIELDOUT
NOEJECT TO PRINT
SET PRINT ON
?
?
?
? LINE1
?
? LINE2
? LINE3
?
? LINE4
IF ATT_MIN > 0
   ? LINE5
ELSE
ENDIF
?
SET PRINT OFF
RETURN
```

```
TYPE \NEWNET\PRNTMCI.PRG



CLEAR
NAME = FILENAME + ".MCI"
USE \RESULTS\&NAME
RESTORE FROM \TABLES\CONSTANT ADDITIVE
SUM QUANTITY TO NUMLINES
IF NUMLINES = 0
    CONECTOTAL = 0
ELSE
    CONECTOTAL = MCICONNECT * NUMLINES
ENDIF


LINE1 = "     Access charge is $" + STR(MCI_ACCESS,6,2) + " per line."
LINE2 = "     Connection charge is $" + STR(MCICONNECT,6,2) + " per line."
LINE3 = "     Total connection charge for this configuration is $"     + STR(CO
NECTOTAL,7,2) + "."
LINE4 = "     Minimum usage charge is $" + STR(MCI_MIN,6,2) +      " per line e
xclusive of access charges."

REPORT FORM \NOWNET\MCIOUT HEADING "           OPTIMIZED CONFIGURATION: "
+ FIELDOUT +  "           " + "("  + STR(METRO,3,0) + "% ON-NET/" +
  STR(100-METRO,3,0) + "% OFF-NET" + ")" TO PRINT
SET PRINT ON
?
?
?
? LINE1
?
? LINE2
?
? LINE3
?
IF MCI_MIN > 0
    ? LINE4
ELSE
ENDIF
?
SET PRINT OFF

RETURN


SET ECHO OFF
```

```
TYPE \NEWNET\PRNTSPNT.PRG



CLEAR
NAME = FILENAME + ".SPT"
USE \RESULTS\&NAME
RESTORE FROM \TABLES\CONSTANT ADDITIVE

IF QUANTITY = 0
   CONECTOTAL = 0
ELSE
   CONECTOTAL = SPNTCONECT * QUANTITY
ENDIF

LINE1 = "     Access charge is $" + STR(SPNTACCESS,6,2) + " per line."
LINE2 = "     Total monthly access charge for this configuration is $"     + ST
R(SPNTACCESS * QUANTITY,7,2) + "."
LINE3 = "     Connection charge is $" + STR(SPNTCONECT,6,2) + " per line."
LINE4 = "     Total connection charge for this configuration is $"     + STR(CO
NECTOTAL,7,2) + "."
LINE5 = "     Minimum usage charge is $" + STR(SPRNT_MIN,6,2) +      "per line
exclusive of access charges."
LINE6 = "     Total monthly cost for this configuration is $" + STR(SPNT_TOTAL,
12,2) + "."
REPORT FORM SPRNTOUT HEADING "           OPTIMIZED CONFIGURATION: "    + FIELD
OUT + "           " + "(" + STR(METRO,3,0) + "% ON-NET/"     + STR(100-METRO,3
,0) + "% OFF-NET" + ")" TO PRINT
SET PRINT ON
?
?
?
? LINE1
? LINE2
?
? LINE3
? LINE4
?
IF SPRNT_MIN > 0
   ? LINE5
   ?
ELSE
ENDIF
? LINE6
?
SET PRINT OFF
RETURN
```

```
TYPE \NEWNET\PRNTSBS.PRG


CLEAR
NAME = FILENAME + ".SBS"
USE \RESULTS\&NAME
RESTORE FROM \TABLES\CONSTANT ADDITIVE
LINE1 = "     Access charge is $" + STR(SBS_ACCESS,6,2) + " per line."
LINE2 = "     Total monthly access charge for this configuration is $" + STR(AC
CES_SBS,7,2) + "."
LINE3 = "     Minimum usage charge is $" + STR(SBS_MIN,6,2) +      " if average
 use is less than " + STR(SBS_HRSMIN,3,0) + " hours/line."
LINE4 = "     Total monthly cost for this configuration is $" +     STR(SBS_TOT
AL,11,2) + "."
LINE5 = "     Connection charges per line are based on the distance between you
r"
LINE6 = "     exchange carrier wire center and the SBS Skyline WATS access poin
t."
REPORT FORM \NOWNET\SBSOUT HEADING "OPTIMIZED CONFIGURATION: " + FIELDOUT     T
O PRINT
SET PRINT ON
?
?
?
? LINE1
? LINE2
IF SBS_MIN > 0
    ?
    ? LINE3
ELSE
ENDIF
? LINE4
?
? LINE5
? LINE6
USE \TABLES\SBSCONEC
SET MARGIN TO 30
?
?
?
DISPLAY OFF ALL
?
SET MARGIN TO 0
SET PRINT OFF

RETURN
```

```
TYPE \NEWNET\PRNTOUT.PRG



CLEAR
NAME = FILENAME + ".NEW"
USE \RESULTS\&NAME
LINE0 = '                    OUT WATS                          OUT WATS'
LINE1 = '              BUSY HOUR TRAFFIC                 MONTHLY TRAFFIC'
LINE2 = '                  (Minutes)                        (Hours)'
LINE3 = '                                          DAY       EVENING    NIGHT/WEEKE
ND'
NUMBER = 1

DO WHILE NUMBER <= MAXOUT
    PEAKNAME = 'PEAKHR' + STR(BAND,1,0) + 'OUT'
    LINENAME = 'LINE' + STR(BAND + 3,1,0)
    &LINENAME = '    BAND ' + STR(BAND,1,0) + '       ' +         STR(&PEAKNAME
,6,1) + '             ' + STR(USE_DAY,6,2) + '      ' +         STR(USE_EVE,6,2
) + '        ' + STR(USE_NIGHT,6,2)

    SKIP
    NUMBER = NUMBER + 1
ENDDO

GOTO TOP

SET PRINT ON
?
?
? LINE0
? LINE1
? LINE2
? LINE3
?

NUMBER = 1

DO WHILE NUMBER <= MAXOUT
    LINENAME = 'LINE' + STR(BAND + 3,1,0)
    ? &LINENAME
    SKIP
    NUMBER = NUMBER + 1
ENDDO
?
SET PRINT OFF
RETURN
```

```
TYPE \NEWNET\PRNTTIN.PRG



CLEAR
NAME = FILENAME + ".TIN"
USE \RESULTS\&NAME
RESTORE FROM \TABLES\CONSTANT ADDITIVE
SUM QUANTITY TO NUMLINES
SELECT 2
USE \TABLES\AT&TIN

IF NUMLINES = 0
    CONECTOTAL = 0
ELSE
    CONECTOTAL = CONNECT1 + (NUMLINES) *CONNECT2
ENDIF

SELECT 1
LINE1 = "     Access charge is $" + STR(B->ACCESS,6,2) + " per line."
LINE2 = "     Connection charge is $" + STR(B->CONNECT1,6,2) + " for the first
line and "
LINE3 = "     $" + STR(B->CONNECT2,6,2) + " for each successive line."
LINE4 = "     Total connection charge for this configuration is $"  + STR(CONEC
TOTAL,7,2) + "."
LINE5 = "     Minimum usage charge is $" + STR(ATT_MININ,6,2) + " per line excl
usive of access charges."

REPORT FORM \NOWNET\AT&TIN HEADING "OPTIMIZED CONFIGURATION: " + FIELDIN     TO
 PRINT
SET PRINT ON
?
?
?
? LINE1
?
? LINE2
? LINE3
?
? LINE4
IF ATT_MININ > 0
    ? LINE5
ELSE
ENDIF
?
SET PRINT OFF
RETURN
```

```
TYPE \NEWNET\PRNTIN.PRG



CLEAR
NAME = FILENAME + ".NEW"
USE \RESULTS\&NAME
LINE0 = '                IN WATS                        IN WATS'
LINE1 = '            BUSY HOUR TRAFFIC              MONTHLY TRAFFIC'
LINE2 = '               (Minutes)                      (Hours)'
LINE3 = '                                      DAY       EVENING    NIGHT/WEEKE
ND'
NUMBER = 1
LOCATE FOR .NOT. OUT

DO WHILE NUMBER <= MAXIN
    PEAKNAME = 'PEAKHR' + STR(BAND,1,0) + 'IN'
    LINENAME = 'LINE' + STR(BAND + 3,1,0)
    &LINENAME = '    BAND ' + STR(BAND,1,0) + '       ' +         STR(&PEAKNAME
,6,1) + '             ' + STR(USE_DAY,6,2) + '       ' +         STR(USE_EVE,6,2
) + '        ' + STR(USE_NIGHT,6,2)
    SKIP
    NUMBER = NUMBER + 1
ENDDO

LOCATE FOR .NOT. OUT
SET PRINT ON
?
?
? LINE0
? LINE1
? LINE2
? LINE3
?

NUMBER = 1

DO WHILE NUMBER <= MAXIN
    LINENAME = 'LINE' + STR(BAND + 3,1,0)
    ? &LINENAME
    SKIP
    NUMBER = NUMBER + 1
ENDDO

?
SET PRINT OFF
RETURN
```

```
TYPE \TABLES\TABLES.PRG


CLEAR ALL
CLEAR
TEXT


                    LOAD NEW CARRIER RATE TABLES


       This option will load new carrier rate tables onto the OPTICOM
    program as well as any new parameters such as access charges,
    connection charges, minimum amount billed, etc.  WARNING!  OLD
    TABLES AND PARAMETERS WILL BE ERASED.  IF YOU DESIRE TO SAVE THE
    OLD TABLES OR RUN DATA USING THE OLD TABLES, BE SURE TO MAKE A COPY
    OF THIS DISK BEFORE PROCEEDING.


ENDTEXT

CHOICE = "N"
DO WHILE .T.
    @ 20,10 SAY "DO YOU WISH TO CONTINUE WITH THIS OPTION (Y/N)?"       GET CH
OICE PICTURE "!"
    READ
    DO CASE
        CASE CHOICE = "Y"
            DO LOAD
            RETURN
        CASE CHOICE = "N"
            RETURN
    ENDCASE
ENDDO

SET ECHO OFF
```

```
TYPE \TABLES\LOAD.PRG



CLEAR ALL
CLEAR
OPTICOMFIL = " "
DBASEFIL = " "
DO WHILE .NOT. ((DBASEFIL >= "C" .AND. DBASEFIL <= "D" .AND.     OPTICOMFIL >=
"A" .AND. OPTICOMFIL <= "D") .OR. (DBASEFIL = "A"     .AND. OPTICOMFIL >= "B" .
AND. OPTICOMFIL <= "D"))

    OPTICOMFIL = " "
    DBASEFIL = " "
    @ 8,10 SAY "WHICH DRIVE IS OPTICOM PROGRAM ON (A/B/C/D)?" GET         OPTIC
OMFIL PICTURE "!"
    @ 10,10 SAY "WHICH DRIVE IS DBASE III ON (A/B/C/D)?" GET DBASEFIL         P
ICTURE "!"
    READ
ENDDO

@ 15,10 SAY "INSERT FLOPPY WITH UPDATED TABLES IN DRIVE B."
WAIT

DO CASE
    CASE OPTICOMFIL = "C"
        ! COPY B:\TABLES\*.DBF C:\TABLES\*.DBF
        ! COPY B:\TABLES\*.MEM C:\TABLES\*.MEM
        RETURN
    CASE OPTICOMFIL = "D"
        ! COPY B:\TABLES\*.DBF D:\TABLES\*.DBF
        ! COPY B:\TABLES\*.MEM D:\TABLES\*.MEM
        RETURN
    CASE DBASEFIL = "A"
        ! MD A:\TABLES
        ! COPY B:\TABLES\*.DBF A:\TABLES\*.DBF
        ! COPY B:\TABLES\*.MEM A:\TABLES\*.MEM
    CASE DBASEFIL = "C"
        ! MD C:\TABLES
        ! COPY B:\TABLES\*.DBF C:\TABLES\*.DBF
        ! COPY B:\TABLES\*.MEM C:\TABLES\*.MEM
    CASE DBASEFIL = "D"
        ! MD D:\TABLES
        ! COPY B:\TABLES\*.DBF D:\TABLES\*.DBF
        ! COPY B:\TABLES\*.MEM D:\TABLES\*.MEM
ENDCASE
```

```
CLEAR
@ 15,10 SAY "INSERT FLOPPY WITH OPTICOM PROGRAM IN DRIVE B."
WAIT

DO CASE
    CASE DBASEFIL = "A"
        ! COPY A:\TABLES\*.DBF B:\TABLES\*.DBF
        ! COPY A:\TABLES\*.MEM B:\TABLES\*.MEM
        ! ERASE A:\TABLES\*.*
        ! RD A:\TABLES
    CASE DBASEFIL = "C"
        ! COPY C:\TABLES\*.DBF B:\TABLES\*.DBF
        ! COPY C:\TABLES\*.MEM B:\TABLES\*.MEM
        ! ERASE C:\TABLES\*.*
        ! RD C:\TABLES
    CASE DBASEFIL = "D"
        ! COPY D:\TABLES\*.DBF B:\TABLES\*.DBF
        ! COPY D:\TABLES\*.MEM B:\TABLES\*.MEM
        ! ERASE D:\TABLES\*.*
        ! RD D:\TABLES
ENDCASE

RETURN

SET ECHO OFF
```

```
TYPE \RESULTS\RESULTS.PRG


CLEAR ALL
CLEAR
@ 5,10 SAY "EXISTING RESULT FILES ARE:"
?
?
DIR \RESULTS\*.DBF
?
?
STORE "N" TO CHOICE
STORE "        " TO FILENAME
DO WHILE .T.
    @ 24,0 SAY "DO YOU WISH TO SEE ANY OF THESE FILES (Y/N)?" GET CHOICE PICTUR
E "!"
    READ
    DO CASE
        CASE CHOICE = "Y"
            SET SAFETY OFF
            @ 24,50 SAY "CHOOSE ONE:" GET FILENAME PICTURE "!!!!!!!!"
            READ

            IF FILENAME = "        "
                RETURN
            ENDIF

            FILENAME = TRIM(FILENAME)
            SAVE TO \RESULTS\TEMP
            DO OUTPUT
            SET SAFETY ON
            RETURN
        CASE CHOICE = "N"
            RETURN
    ENDCASE
ENDDO


SET ECHO OFF
```

```
TYPE \RESULTS\OUTPUT.PRG



CLEAR
FILENAME = TRIM(FILENAME)
USE &FILENAME
COPY TO \NOWNET\RESULTS
RESTORE FROM \RESULTS\&FILENAME
RELEASE ALL EXCEPT METRO
SAVE TO \RESULTS\METRO
RESTORE FROM \TABLES\CONSTANT
RESTORE FROM METRO ADDITIVE
SAVE TO \TABLES\CONSTANT
DO WHILE .T.
    CLEAR
    STORE " " TO CHOICE
    @  8,25 SAY "-1- DISPLAY RESULTS ON SCREEN."
    @ 10,25 SAY "-2- PRINT OUT THE RESULTS."
    @ 13,25 SAY "-0- FINISHED."
    @ 17,25 SAY "CHOOSE ONE:"  GET CHOICE PICTURE "9"
    READ

    DO CASE
        CASE CHOICE = "1"
            DO DISPLAY
        CASE CHOICE = "2"
            DO PRINT
        CASE CHOICE = "0"
            RETURN
    ENDCASE

ENDDO

SET ECHO OFF
```

```
TYPE \RESULTS\DISPLAY.PRG



CLEAR
SET PATH TO B:\NOWNET
DO DISPLAY
RESTORE FROM \RESULTS\TEMP
RESTORE FROM \RESULTS\&FILENAME ADDITIVE

IF OPTIMIZE
    SET PATH TO B:\NEWNET
    DO DISPLAY
    SET PATH TO B:\RESULTS
ENDIF

RETURN

SET ECHO OFF
```

```
TYPE \RESULTS\PRINT.PRG


CLEAR
SET PATH TO B:\NOWNET
DO PRINT
RESTORE FROM \RESULTS\TEMP
RESTORE FROM \RESULTS\&FILENAME ADDITIVE

IF OPTIMIZE
    SET PATH TO B:\NEWNET
    DO PRINT
    SET PATH TO B:\RESULTS
ENDIF

RETURN

SET ECHO OFF
```

```
TYPE \DELETE\DELETE.PRG


CLEAR ALL
CLEAR
@ 5,10 SAY "EXISTING RESULT FILES ARE:"
?
?
DIR \RESULTS\*.DBF
?
?
STORE "N" TO CHOICE
STORE "        " TO FILENAME
@ 23,0 SAY "DO YOU WISH TO DELETE ANY OF THESE FILES (Y/N)?" GET CHOICE PICTURE
 "!"
READ
IF CHOICE = 'Y'
   @ 23,50 SAY "CHOOSE ONE:" GET FILENAME PICTURE "!!!!!!!!"
   READ

   IF FILENAME = "        "
      RETURN
   ENDIF

   FILENAME = TRIM(FILENAME)
   RESTORE FROM \RESULTS\&FILENAME

   ! ERASE B:\DELETE\*.ATT
   ! ERASE B:\DELETE\*.MCI
   ! ERASE B:\DELETE\*.SPT
   ! ERASE B:\DELETE\*.SBS
   ! ERASE B:\DELETE\*.DBF
   ! ERASE B:\DELETE\*.MEM
   ! ERASE B:\DELETE\*.NEW
   ! ERASE B:\DELETE\*.TIN


   NAME = FILENAME + '.MEM'
   COPY FILE \RESULTS\&NAME TO \DELETE\&NAME
   DELETE FILE \RESULTS\&NAME

   NAME = FILENAME + '.DBF'
   COPY FILE \RESULTS\&NAME TO \DELETE\&NAME
   DELETE FILE \RESULTS\&NAME

   IF OPTIMIZE
```

```
        USE \DELETE\&NAME

        NAME = FILENAME + '.NEW'
        COPY FILE \RESULTS\&NAME TO \DELETE\&NAME
        DELETE FILE \RESULTS\&NAME

        IF OUT

            NAME = FILENAME + '.ATT'
            COPY FILE \RESULTS\&NAME TO \DELETE\&NAME
            DELETE FILE \RESULTS\&NAME

            NAME = FILENAME + '.MCI'
            COPY FILE \RESULTS\&NAME TO \DELETE\&NAME
            DELETE FILE \RESULTS\&NAME

            NAME = FILENAME + '.SPT'
            COPY FILE \RESULTS\&NAME TO \DELETE\&NAME
            DELETE FILE \RESULTS\&NAME

            NAME = FILENAME + '.SBS'
            COPY FILE \RESULTS\&NAME TO \DELETE\&NAME
            DELETE FILE \RESULTS\&NAME

        ENDIF

        LOCATE FOR .NOT. OUT

        IF BAND > 0

            NAME = FILENAME + '.TIN'
            COPY FILE \RESULTS\&NAME TO \DELETE\&NAME
            DELETE FILE \RESULTS\&NAME

        ENDIF
    ENDIF
ENDIF

RETURN


SET ECHO OFF
```

APPENDIX C

OPTICOM PROGRAM FILE STRUCTURES

Structure for database : B:±NOWNET±NOWNET.dbf
Number of data records : 2
Date of last update : 12/20/85

Field	Field name	Type	Width	Dec
1	BAND	Numeric	1	
2	OUT	Logical	1	
3	QUANTITY	Numeric	2	
4	USE_DAY	Numeric	6	2
5	USE_EVE	Numeric	6	2
6	USE_NIGHT	Numeric	6	2
** Total **			23	

Structure for database : B:±NOWNET±RESULTS.dbf
Number of data records : 4
Date of last update : 12/03/85

Field	Field name	Type	Width	Dec
1	BAND	Numeric	1	
2	OUT	Logical	1	
3	QUANTITY	Numeric	2	
4	USE_DAY	Numeric	6	2
5	USE_EVE	Numeric	6	2
6	USE_NIGHT	Numeric	6	2
7	DAY_ATT	Numeric	8	2
8	EVE_ATT	Numeric	8	2
9	NIGHT_ATT	Numeric	8	2
10	ACCES_ATT	Numeric	7	2
11	ATT_TOTAL	Numeric	9	2
12	DAY_MCI	Numeric	8	2
13	EVE_MCI	Numeric	8	2
14	NIGHT_MCI	Numeric	8	2
15	ACCES_MCI	Numeric	7	2
16	MCI_TOTAL	Numeric	9	2
17	DAY_SPNT	Numeric	8	2
18	EVE_SPNT	Numeric	8	2
19	NIGHT_SPNT	Numeric	8	2
20	ACCES_SPNT	Numeric	7	2
21	SPNT_TOTAL	Numeric	9	2
22	SBS_LINES	Numeric	3	
23	TIER	Numeric	1	
24	PERCENT	Numeric	2	
25	SBSHRS_DAY	Numeric	6	2
26	DAY_SBS	Numeric	8	2
27	SBSHRS_EVE	Numeric	6	2
28	NIGHT_SBS	Numeric	8	2
29	ACCES_SBS	Numeric	8	2
30	SBS_TOTAL	Numeric	11	2
** Total **			196	

Structure for database : B:\NEWNET\POISSON.dbf
Number of data records : 20
Date of last update : 12/12/85

Field	Field name	Type	Width	Dec
1	TRUNKS	Numeric	2	
2	P1	Numeric	6	1
3	P2	Numeric	6	1
4	P3	Numeric	6	1
5	P4	Numeric	6	1
6	P5	Numeric	6	1
7	P6	Numeric	6	1
8	P7	Numeric	6	1
9	P8	Numeric	6	1
10	P9	Numeric	6	1
11	P10	Numeric	6	1
12	P11	Numeric	6	1
13	P12	Numeric	6	1
14	P13	Numeric	6	1
15	P14	Numeric	6	1
16	P15	Numeric	6	1
17	P16	Numeric	6	1
18	P17	Numeric	6	1
19	P18	Numeric	6	1
20	P19	Numeric	6	1
21	P20	Numeric	6	1
22	P21	Numeric	6	1
23	P22	Numeric	6	1
24	P23	Numeric	6	1
25	P24	Numeric	6	1
26	P25	Numeric	6	1
27	P26	Numeric	6	1
28	P27	Numeric	6	1
29	P28	Numeric	6	1
30	P29	Numeric	6	1
31	P30	Numeric	6	1
32	P31	Numeric	6	1
33	P32	Numeric	6	1
34	P33	Numeric	6	1
35	P34	Numeric	6	1
36	P35	Numeric	6	1
37	P36	Numeric	6	1
38	P37	Numeric	6	1
39	P38	Numeric	6	1
40	P39	Numeric	6	1
41	P40	Numeric	6	1
42	P41	Numeric	6	1
43	P42	Numeric	6	1
44	P43	Numeric	6	1
45	P44	Numeric	6	1
46	P45	Numeric	6	1
47	P46	Numeric	6	1
48	P47	Numeric	6	1
49	P48	Numeric	6	1
50	P49	Numeric	6	1
51	P50	Numeric	6	1
** Total **			303	

```
Structure for database : B:±NEWNET±POSSIBLE.dbf
Number of data records :       64
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  SIX         Logical        1
    2  FIVE        Logical        1
    3  FOUR        Logical        1
    4  THREE       Logical        1
    5  TWO         Logical        1
    6  ONE         Logical        1
** Total **                       7
```

```
Structure for database : B:±NEWNET±NEWNET.dbf
Number of data records :        5
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  BAND        Numeric        1
    2  OUT         Logical        1
    3  QUANTITY    Numeric        2
    4  USE_DAY     Numeric        6       2
    5  USE_EVE     Numeric        6       2
    6  USE_NIGHT   Numeric        6       2
** Total **                      23
```

```
Structure for database : B:±NEWNET±PEAKHR.dbf
Number of data records :        6
Date of last update    : 10/25/85
Field  Field name  Type       Width     Dec
    1  BAND        Numeric        1
    2  PEAKHR1     Numeric        6       1
    3  PEAKHR2     Numeric        6       1
    4  PEAKHR3     Numeric        6       1
    5  PEAKHR4     Numeric        6       1
    6  PEAKHR5     Numeric        6       1
    7  PEAKHR6     Numeric        6       1
** Total **                      38
```

Structure for database : B:±NEWNET±RESULTS.dbf
Number of data records : 1
Date of last update : 01/01/80

Field	Field name	Type	Width	Dec
1	BAND	Numeric	1	
2	OUT	Logical	1	
3	QUANTITY	Numeric	2	
4	USE_DAY	Numeric	6	2
5	USE_EVE	Numeric	6	2
6	USE_NIGHT	Numeric	6	2
7	DAY_ATT	Numeric	8	2
8	EVE_ATT	Numeric	8	2
9	NIGHT_ATT	Numeric	8	2
10	ACCES_ATT	Numeric	7	2
11	ATT_TOTAL	Numeric	9	2
12	DAY_MCI	Numeric	8	2
13	EVE_MCI	Numeric	8	2
14	NIGHT_MCI	Numeric	8	2
15	ACCES_MCI	Numeric	7	2
16	MCI_TOTAL	Numeric	9	2
17	DAY_SPNT	Numeric	8	2
18	EVE_SPNT	Numeric	8	2
19	NIGHT_SPNT	Numeric	8	2
20	ACCES_SPNT	Numeric	7	2
21	SPNT_TOTAL	Numeric	9	2
22	SBS_LINES	Numeric	3	
23	TIER	Numeric	1	
24	PERCENT	Numeric	2	
25	SBSHRS_DAY	Numeric	6	2
26	DAY_SBS	Numeric	8	2
27	SBSHRS_EVE	Numeric	6	2
28	NIGHT_SBS	Numeric	8	2
29	ACCES_SBS	Numeric	8	2
30	SBS_TOTAL	Numeric	11	2
** Total **			196	

Structure for database : B:±NEWNET±AT&TOUT.dbf
Number of data records : 2
Date of last update : 01/01/80

Field	Field name	Type	Width	Dec
1	BAND	Numeric	1	
2	OUT	Logical	1	
3	QUANTITY	Numeric	2	
4	USE_DAY	Numeric	6	2
5	USE_EVE	Numeric	6	2
6	USE_NIGHT	Numeric	6	2
7	DAY_ATT	Numeric	8	2
8	EVE_ATT	Numeric	8	2
9	NIGHT_ATT	Numeric	8	2
10	ACCES_ATT	Numeric	7	2
11	ATT_TOTAL	Numeric	9	2
** Total **			63	

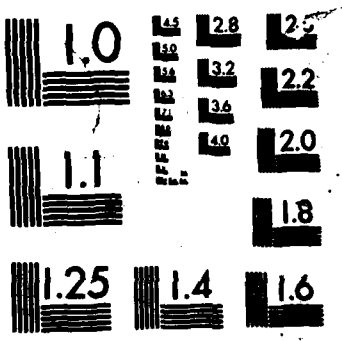
```
Structure for database : B:±NEWNET±MCIOUT.dbf
Number of data records :        2
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  BAND        Numeric        1
    2  OUT         Logical        1
    3  QUANTITY    Numeric        2
    4  USE_DAY     Numeric        6       2
    5  USE_EVE     Numeric        6       2
    6  USE_NIGHT   Numeric        6       2
    7  DAY_MCI     Numeric        8       2
    8  EVE_MCI     Numeric        8       2
    9  NIGHT_MCI   Numeric        8       2
   10  ACCES_MCI   Numeric        7       2
   11  MCI_TOTAL   Numeric        9       2
** Total **                      63
```

```
Structure for database : B:±NEWNET±SPRNTOUT.dbf
Number of data records :        5
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  BAND        Numeric        1
    2  OUT         Logical        1
    3  QUANTITY    Numeric        2
    4  USE_DAY     Numeric        6       2
    5  USE_EVE     Numeric        6       2
    6  USE_NIGHT   Numeric        6       2
    7  DAY_SPNT    Numeric        8       2
    8  EVE_SPNT    Numeric        8       2
    9  NIGHT_SPNT  Numeric        8       2
   10  ACCES_SPNT  Numeric        7       2
   11  SPNT_TOTAL  Numeric        9       2
** Total **                      63
```

```
Structure for database : B:±NEWNET±SKYLINE.dbf
Number of data records :        4
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  SBS_LINES   Numeric        3
    2  TIER        Numeric        1
    3  PERCENT     Numeric        2
    4  SBSHRS_DAY  Numeric        6       2
    5  DAY_SBS     Numeric        8       2
    6  SBSHRS_EVE  Numeric        6       2
    7  NIGHT_SBS   Numeric        8       2
    8  ACCES_SBS   Numeric        8       2
    9  SBS_TOTAL   Numeric       11       2
** Total **                      54
```

AD-A166 744 A COMPUTER PROGRAM FOR OPTIMIZING LONG HAUL TELEPHONE NETWORKS FOR LEAST..(U) AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH S A DRAPER 1986 3/3

UNCLASSIFIED AFIT/CI/NR-86-48T F/G 17/2 NL



MICROCOPY CHART

```
Structure for database : B:±NEWNET±AT&TIN.dbf
Number of data records :        1
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  BAND        Numeric        1
    2  OUT         Logical        1
    3  QUANTITY    Numeric        2
    4  USE_DAY     Numeric        6       2
    5  USE_EVE     Numeric        6       2
    6  USE_NIGHT   Numeric        6       2
    7  DAY_ATT     Numeric        8       2
    8  EVE_ATT     Numeric        8       2
    9  NIGHT_ATT   Numeric        8       2
   10  ACCES_ATT   Numeric        7       2
   11  ATT_TOTAL   Numeric        9       2
** Total **                      63
```

```
Structure for database : B:±TABLES±AT&TOUT.dbf
Number of data records :        6
Date of last update    : 10/07/85
Field  Field name  Type       Width     Dec
    1  BAND        Numeric        1
    2  DAY15       Numeric        5       2
    3  EVE15       Numeric        5       2
    4  DAY25       Numeric        5       2
    5  EVE25       Numeric        5       2
    6  DAY40       Numeric        5       2
    7  EVE40       Numeric        5       2
    8  DAY80       Numeric        5       2
    9  EVE80       Numeric        5       2
   10  WEEKEND     Numeric        5       2
   11  ACCESS      Numeric        5       2
   12  CONNECT1    Numeric        6       2
   13  CONNECT2    Numeric        6       2
** Total **                      64
```

```
Structure for database : B:±TABLES±AT&TIN.dbf
Number of data records :        6
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  BAND        Numeric        1
    2  DAY15       Numeric        5       2
    3  EVE15       Numeric        5       2
    4  DAY25       Numeric        5       2
    5  EVE25       Numeric        5       2
    6  DAY40       Numeric        5       2
    7  EVE40       Numeric        5       2
    8  DAY80       Numeric        5       2
    9  EVE80       Numeric        5       2
   10  WEEKEND     Numeric        5       2
   11  ACCESS      Numeric        5       2
   12  CONNECT1    Numeric        6       2
   13  CONNECT2    Numeric        6       2
** Total **                      64
```

```
Structure for database : B:±TABLES±SPRNTOUT.dbf
Number of data records :       12
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  BAND        Numeric        1
    2  ON_NET      Logical        1
    3  DAY0_40     Numeric        5       2
    4  EVE0_40     Numeric        5       2
    5  DAY40_70    Numeric        5       2
    6  EVE40_70    Numeric        5       2
    7  DAY70_100   Numeric        5       2
    8  EVE70_100   Numeric        5       2
    9  DAY100PLUS  Numeric        5       2
   10  EVE100PLUS  Numeric        5       2
   11  WEEKEND     Numeric        5       2
** Total **                      48
```

```
Structure for database : B:±TABLES±SBSOUT.dbf
Number of data records :       44
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  USAGE_HRS   Numeric        3
    2  TIER1_DAY   Numeric        5       2
    3  TIER1_OTHR  Numeric        5       2
    4  TIER2_DAY   Numeric        5       2
    5  TIER2_OTHR  Numeric        5       2
    6  TIER3_DAY   Numeric        5       2
    7  TIER3_OTHR  Numeric        5       2
    8  TIER4_DAY   Numeric        5       2
    9  TIER4_OTHR  Numeric        5       2
** Total **                      44
```

```
Structure for database : B:±TABLES±SBSIN.dbf
Number of data records :       42
Date of last update    : 01/01/80
Field  Field name  Type       Width     Dec
    1  USAGE_HRS   Numeric        3
    2  TIER1_DAY   Numeric        5       2
    3  TIER1_OTHR  Numeric        5       2
    4  TIER2_DAY   Numeric        5       2
    5  TIER2_OTHR  Numeric        5       2
    6  TIER3_DAY   Numeric        5       2
    7  TIER3_OTHR  Numeric        5       2
** Total **                      34
```

Structure for database : B:±TABLES±MCIOUT.dbf
Number of data records : 12
Date of last update : 10/11/85

Field	Field name	Type	Width	Dec
1	BAND	Numeric	1	
2	ON_NET	Logical	1	
3	DAY15	Numeric	5	2
4	EVE15	Numeric	5	2
5	DAY25	Numeric	5	2
6	EVE25	Numeric	5	2
7	DAY40	Numeric	5	2
8	EVE40	Numeric	5	2
9	DAY80	Numeric	5	2
10	EVE80	Numeric	5	2
11	WEEKEND	Numeric	5	2
** Total **			48	

Structure for database : B:±TABLES±SBSCONEC.dbf
Number of data records : 5
Date of last update : 10/18/85

Field	Field name	Type	Width	Dec
1	DISTANCE	Character	15	
2	COST	Numeric	6	2
** Total **			22	

```
  RESTORE FROM ±TABLES±CONSTANT
. LIST MEMORY TO PRINT
CHOICE        pub   C  "Y"
FLAG          pub   L  .F.
METRO         pub   N           80  (         80.00000000)
SBS1          pub   N           66  (         66.00000000)
SBS2          pub   N           22  (         22.00000000)
SBS3          pub   N           11  (         11.00000000)
SBS4          pub   N            1  (          1.00000000)
MCI_MIN       pub   N        75.00  (         75.00000000)
MCI_ACCESS    pub   N       100.00  (        100.00000000)
MCICONNECT    pub   N       120.00  (        120.00000000)
SPNTCONECT    pub   N        75.00  (         75.00000000)
SPNTACCESS    pub   N        75.00  (         75.00000000)
SBS_ACCESS    pub   N       100.00  (        100.00000000)
SBS_MIN       pub   N       400.00  (        400.00000000)
SBS_HRSMIN    pub   N           50  (         50.00000000)
ATT_MIN       pub   N            0  (          0.00000000)
SPRNT_MIN     pub   N            0  (          0.00000000)
ATT_MININ     pub   N            0  (          0.00000000)
   18 variables defined,      149 bytes used
  238 variables available,   5851 bytes available
.


  RESTORE FROM ±TABLES±DATE
. LIST MEMORY TO PRINT
DATE          pub   C  " 1 JULY 1985"
    1 variables defined,       14 bytes used
  255 variables available,   5986 bytes available
.
```

APPENDIX D

TRAFFIC MODELS

Poisson

The probability of a call being blocked when there are N trunks carrying a total of T erlangs of traffic is given by the formula:

$$P_p(N,T) = 1 - \sum_{i=0}^{N-1} \frac{T^i e^{-T}}{i!}$$

This formula does not take into account whether blocked calls are diverted from the system or delayed as in Erlang B and Erlang C.[3] An erlang of traffic is defined as 60 minutes of circuit usage; i.e., one call of 60 minutes duration and six calls of ten minutes duration both equal one erlang of traffic.

Another unit often used to express traffic is the CCS which stands for hundreds of call-seconds per hour. In this case T = CCS/36 or CCS = 36T. Jerry Finefrock[2] indicates that both the erlang and CCS are difficult terms to use. Consequently, his tables are expressed in total minutes of usage for easier use and understanding.

The "P" number generally indicates the percentage of calls reaching a busy signal on the first attempt.

P.01 means one percent of the calls reach a busy signal. As the "P" number or level of traffic increases, the actual percentage of blocked calls exceeds the "P" number so it is then only an approximation. For example, at P.25 with 20 circuits, the actual percentage of blocked calls is 35%.[2]

Erlang B

This formula was derived by A.K. Erlang of Denmark in the early 20th century for systems where blocked calls are diverted from the system and sent via alternate facilities. The formula is expressed as:[1]

$$P_b\,(N,T) = \frac{\frac{T^N e^{-T}}{N!}}{\sum_{i=0}^{N} \frac{T^i e^{-T}}{i!}}$$

Extended Erlang B

This model was developed by James E. Jewett for situations when immediate overflow is not available and blocked calls do not exit from the system. It applies a factor to the Erlang B formula to calculate reattempt traffic.[4]

Erlang C

This applies to systems which have an infinite queue and blocked calls are merely delayed until a trunk is available. The formula is:[3]

$$P_c(N,T) = \frac{\frac{T^N e^{-T}}{N!} * \frac{N}{N-T}}{\sum_{i=0}^{N} \frac{T^i e^{-T}}{i!} + \frac{T^N e^{-T}}{N!} * \frac{T}{N-T}}$$

Table Values

Values used in the traffic tables for this program are in minutes. The AT&T, MCI, and SPRINT rate tables are expressed in cost/hour. The SBS Skyline rate table is expressed in cost/minute.

END

FILMED

5-86

DTIC